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*The Story of
Our Amphibious Forces*



WHITTLESEY HOUSE

MC GRAW-HILL BOOK COMPANY, INC.

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BY SEA AND BY LAND

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FOR
THE MEN
OF THE AMPHIBIOUS FORCES

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Foreword

"Yanks land on ——."

Many times since December 7, 1941, headlines similar to this have appeared in our daily papers, but comparatively few persons, in or out of the military and naval services, realize the backstage activities that made these announcements possible. Most of us absorb only the thrill attending the reading, similar to that feeling one experiences in witnessing a gigantic stage spectacle; and we wonder how it was done. If the public had been permitted to see the detailed planning and the time and effort the cast applied to make the landing possible, the astonishment would be all the greater.

Amphibious operations are dramas of life and death and the members of the cast are our soldiers and sailors. Their backstage life cannot be fully revealed at this time, but suffice it to say it is hard and exacting and requires courage of the highest order. The rehearsals—preliminary training—are shrouded in secrecy. It must be that way, and not until the very minute of attack against the enemy-held beach do many, beyond the members of the task force, know anything about the operation.

I have lived with these men and have seen them train on land and sea, under both ideal and miserable conditions. At best it is a life of hard work. We know that, unlike any other form of warfare, an amphibious operation cannot strike, fail, retreat, and try again. It must succeed the first time. This requires teamwork and the coalescing of the Army and Navy components into a hard-hitting and fast-moving force.

That teamwork exists. This war has brought the Army and Navy closer together than ever before in our history, and Amphibious Forces are the epitome of everything that is sought in military efficiency.

Without the success of the initial thrust over the enemy-held beaches, our final effort could never materialize. It is the Amphibious Forces who are carrying the vanguard of victory of American arms to Japan and Germany, and nothing either enemy has to offer can stop them.

It is to the men of the Amphibious Forces that this book has been dedicated. Their accomplishments have been great; they will be even greater. They have won and earned our thanks and gratitude.

BRIGADIER GENERAL FRANK A. KEATING,
U. S. Army.

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BY SEA AND BY LAND



Pattern for Invasion

THE little bar at 116 Piccadilly was almost empty. The radio was turned low. A BBC orchestra was playing its jitterbug version of a current song. An RAF pilot and an officer in the uniform of the Fleet Air Arm sat in two of the modernistic maple chairs. They were talking quietly. The RAF pilot dug deep in his blue pocket for a package of Players and offered one to his companion.

116 Piccadilly was the Athenaeum Court, a steel and concrete apartment hotel that had somehow escaped the blitz bombs in that area. It had its brick blast-wall protecting the front door, sand bags were stacked high against the basement windows, and in the lobby a red plush carpet made a path to the desk where two aged attendants in green uniform alternated in the duties of doorman and clerk. Several officers, British and American, lived here. Nightcap time usually found a few of them in the piano-sized bar, getting their "one for the road" drink and talking to the barkeeper. She was a blonde with hair the color of Cuban gin. She called everyone darling and said that she was born in Omaha.

"Two gin and limes, please." The RAF pilot looked toward the bar.

"Right away, darling." She measured out the jiggers of gin and then watched the green lime-juice extract spiral through it and bounce up from the bottom of the glass as she poured from another bottle.

"Much too nice a night to drink," she said, to herself.

I had been in London less than a month, attached to U. S. Naval headquarters. It was a nice evening, a mid-August London evening. Outside, you could hear the muffled tones and the cackle of laughter from couples across the street in Green Park. Heavy boots and light heels tinkled on the sidewalks, and the possessive cries of "Taxi" rang in the black-out. Conversation that day had been excited and largely about one topic—the raid on Dieppe. The morning papers had carried the story.

"That in itself would indicate this is no mere Commando raid," the man in his new "utility" suit had said while waiting his turn for lunch at the teashop. "If it was an ordinary raid we wouldn't know about it till it was over. And it's still goin' on."

The RAF pilot picked up his glasses of gin and lime and left two shillings sixpence on the counter. The door opened, and an American Army colonel came in. He tossed his hat into an empty chair and took the vacant stool next to me at the bar.

"Hello, darling." It was the girl with the gin-colored hair. "Whisky and soda?"

"Yes," the colonel answered.

"Want some ice in it, darling?"

"Of course I want ice."

"My, my, we're grumpy tonight, aren't we?" She

stooped, out of sight, behind the bar to search for some ice slivers. The colonel seemed not to have heard.

The music on the radio stopped. An incisive BBC news commentator's voice began.

"We bring you the latest news on the Dieppe raid. . . ."

The colonel looked at his drink, watching the ice slosh around, slowly disappearing, as he drew patterns on the counter with the bottom of the wet glass.

"Two regiments, believed to be the Essex Scottish and the Royal Hamilton Light Infantry, went into Dieppe proper, up a street called Boulevard de Verdun. Their task was to clean out fortified houses, remove all enemy opposition from the beaches so that tanks could be landed . . . ,"

the voice droned on.

I thought of the Dieppe I had seen 5 years ago, a peaceful Dieppe, offering her docks and pier to the Channel boats from England. A colorless place, quiet, stone-built, and sleepy. Now those cobbled streets were being slapped with lead, and the gray buildings were red with fire and smoke. A German soldier would feel quite secure behind those thick stone walls, shooting at invaders through tiny, hard-to-hit windows.

The colonel completed his series of circle patterns on the bar counter.

"I don't understand it," he said. "I simply can't understand it." He wasn't speaking to anyone in particular. He was looking at the glass he held in his hand when he spoke.

"Men are dying over there right now. They're dying by the hundreds. They can't hope to hold the place. This can't be an invasion. We're not ready." He gulped the last of

the whisky and soda. "Damn it. We're not ready." He picked up his cap and left.

The colonel was right on two counts. Dieppe was not an invasion, and we were not yet ready for an invasion. However, Dieppe was the largest "reconnaissance in force" using amphibious instruments yet employed in this war. Its lessons were costly but valuable. It was a prelude to the invasion of Africa that was to come in November, 1942.

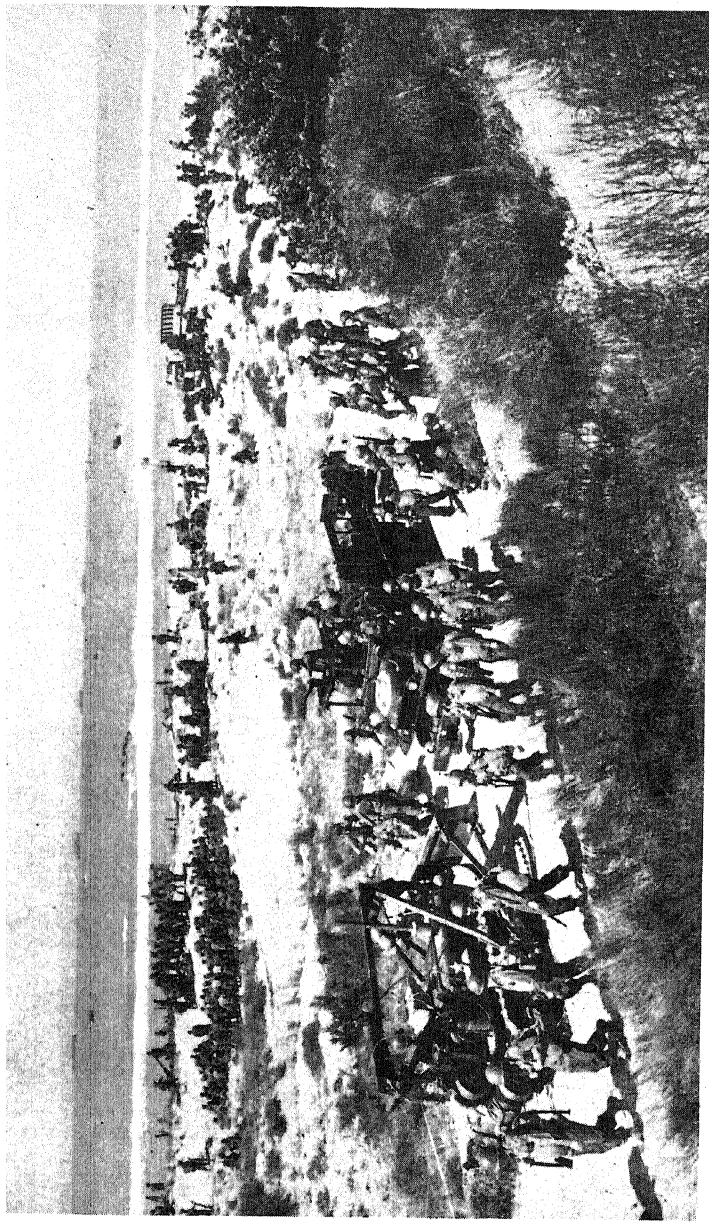
"Our troops have landed in North Africa . . ."

Those were the electrifying words that interrupted radio programs and made banner headlines in the newspapers on November 8, 1942. Three months after the gloomy colonel gulped his drink and left the bar with a "Damn it, we're not ready," those words announced to the world that the Allies had struck. This was no raid. It was a gigantic, continental-sized amphibious invasion. And the men were going in to stay. They wouldn't come out until the last German in North Africa was behind a prison pen.

After almost a year of delaying action America was on the offensive. To a nation still galled by the attack on Pearl Harbor, by watching Rommel's relentless march across the desert to within smelling distance of Alexandria, and to a nation with its internal problems of building tanks, bombers, and ships in the face of incessant cries for a second front, the news of North Africa was a great detergent.

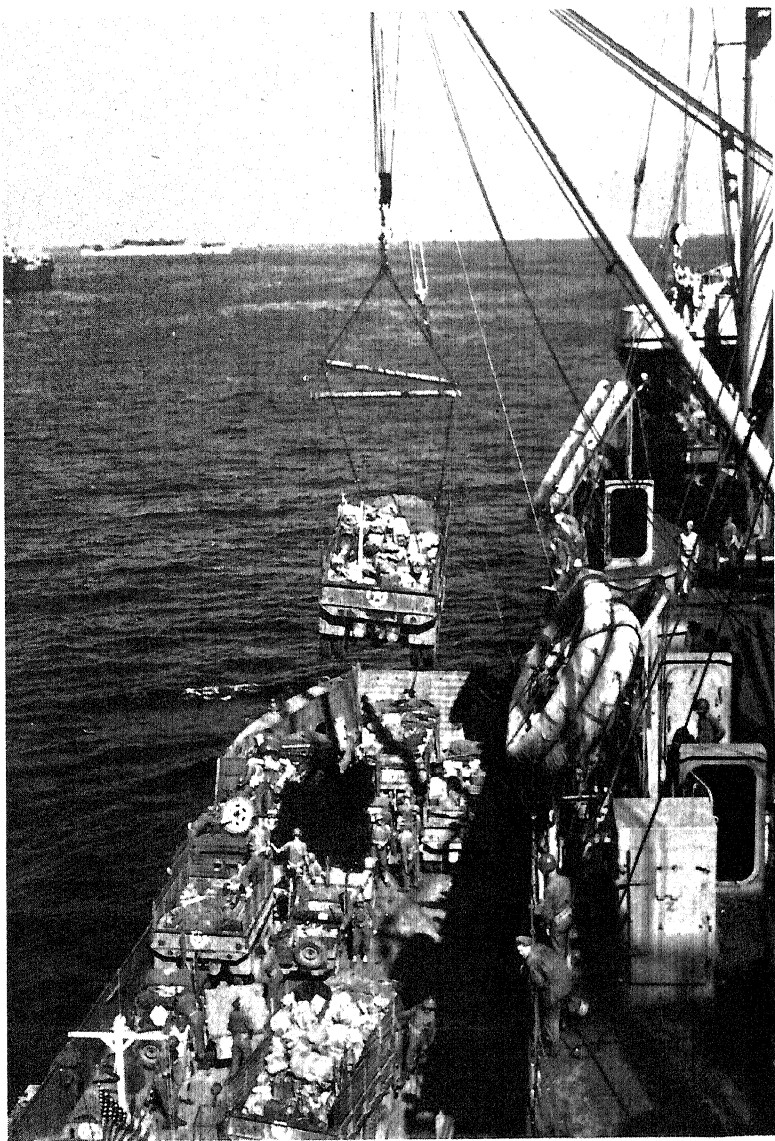
It was the beginning; it was the first combined Army-Navy, British-American assault on the enemy, the first major amphibious adventure.

We gambled and won. We gambled that the Germans, seeing our convoy pass through the Strait of Gibraltar, as



U. S. Atlantic Fleet Amphibious Force Photographic Div.

OUR TROOPS HAVE LANDED



Official U. S. Navy Photograph

LCT WITH A LOAD FOR SALERNO BEACHES

they were certain to do with their "eyes" on next-door Spanish soil, would assume that these ships were bound for Malta. We won that bet. We also gambled on the fact that if the forces coming from America were sighted, the enemy would believe their destination to be Dakar. We won that bet with the aid of well-directed psychological warfare and newspaper hints. Planners also gambled on a new type of warfare, amphibious invasion. But the American Amphibious Force was used to gambling. Its 8 months of existence prior to November 8 had been a continual gamble. First, would Army and Navy work together as a team? Would all the strange, new amphibious craft that came out of the water onto the beaches work; would the problems of supply, of communications, of supporting naval gunfire, and all the intricate pieces that go into the pattern of an amphibious assault fit into place?

To the men of the Amphibious Force this was not much of a gamble. It was more like placing money on a cinch bet. They had confidence that the pieces they had formed would fit. In the testing of this confidence they were lucky. Landings were made in the face of only slight enemy opposition, militarily speaking.

The North African invasion was, in a way, a test. It brought out fundamental principles that could be applied to any amphibious assault, from the shores of Europe to the furthest Pacific island. The Amphibious Team had played its first sandlot game. From hits, runs, and errors in that game it could coach the players for the big-league contests ahead: Sicily, Salerno, almost any place on the Pacific map where you wanted to stick a pin, and, finally, for the series pennant itself, the German-held continent of Europe.

The first of the big-league series was scheduled for July, 1943. It was to be the island of Sicily. The pattern for this invasion was more compact than for the assault on North Africa, which had as its goal the landing on the shores of, and the occupying of, Algeria and French Morocco. Here the invaders had a choice of landing beaches from the city of Algiers, west along the Mediterranean coast to Arzu, Oran, down the coast of Africa from Port Lyautey, Fedala, and Casablanca to Safi.

Sicily presented a different problem. In the first place, to the enemy, Sicily was a logical place for the Allies to land. They had only to look at the map of the Mediterranean area to decide that. It was a short water hop from Tunisia, and all the ports of North Africa were bulging with invasion craft. The enemy knew that something was brewing. That's why German reconnaissance planes made so many trips over those ports. They thought they could tell just when the blow was going to fall. However, our reconnaissance planes were making even more frequent trips over the island of Sicily.

First plans called for an assault on the northern shores of the island, east and west of Palermo. But pictures brought back by our planes showed that this was just what the enemy expected. They were building defenses in that area in preparation for an attack. We continued to let them think we would attack to the north, while a quiet shift of strategy took place.

Many stories have credited the success of our landing on Sicily to the lack of enemy opposition. True. There wasn't much opposition, but this was not the fault of the enemy. The first rule in an amphibious assault is to land your sol-

diers where the enemy doesn't expect them. On a coastline that extends for hundreds of miles he is obviously unable to defend every beach every inch of the way. It can be done on a small atoll like Tarawa, but not on an area like New Guinea or Sicily. The strategy of the attacker then is to find the soft spot, the place where the enemy defenses are lightest, and land soldiers and equipment quickly and in a mass sufficient to hold that area.

Such a place was found on the southern coast of Sicily. The final plans were completed. Commanding the entire operation was General Dwight D. Eisenhower. The assault strength was broken down into what we call task forces, smaller units under separate command, working as members of a team.

It was a great converging movement. From his palm-terraced, bright-tiled headquarters in Algiers, the St. George Hotel, General Eisenhower drew his forces in a three-pronged assault. One force crossed the Atlantic from America. Another left the British Isles; and east from Alexandria, Egypt, and from all the little ports along the Mediterranean coast of North Africa came other units drawn toward the island of Sicily as if it were a great magnet.

Before the news of Sicily flashed to the world, our troops had landed on Attu in the Aleutians. In the south, they had invaded New Guinea and stormed ashore at Rendova. After Sicily, the long amphibious arm stretched north again to Kiska. Two days later, in the South Pacific, Vella Lavella felt the thunder of invasion, and on July 30, troops were on the beaches of Arundel Island in the Solomons.

September echoed to the landings on the Italian main-

land, at Salerno, and in the Pacific at Salamaua and Finschhafen. Then in quick succession came Bougainville, the Gilberts, bloody Tarawa, Makin, and New Britain. In the first month of 1944 our troops landed 30 miles from Rome in a leapfrog jump up the coast to Anzio. Nine days later Kwajalein in the Marshalls was virtually pulverized by the greatest massing of assault strength ever used. February had four D-days, an invasion a week. The first was Rooke Island, between New Guinea and New Britain. Then came the landings on the Green Islands which ended the Solomons campaign, followed by Eniwetok and the invasion of the Admiralty Islands.

It's pure cliché to say that war is a complicated business. But I know of no simpler way to express this truth. And amphibious warfare has a special complication all its own.

First comes a period of strangled emotions. A mild wind blows the little waves, whipping their crests into a million white eyebrows as you see the shores of home disappear. Then you look at the strength around you. There's something very majestic about a convoy, even a dirty, slow merchant convoy. But a parade of invasion-bound transports, throwing their big wakes in perfect pattern, turning and maneuvering with the escorting destroyers and cruisers, gives you a picture not easily acquired, a glimpse of organized war before it becomes seemingly disorganized. It gives you a feeling of the gigantic web of planning, training, and building that meant this massing of men and material.

The days pass and the men settle into a routine of transport life. But the time of waiting is almost over for every-

one. The days of training will soon be tested. Time seems to lose its present tense. The future, which means action, 10, 15, or 20 days hence, is the common denominator for all men.

Certain things have to be done. Troops have to be fed, watches stood. Men have to remember their mess hour and the times fresh water is turned off and on. A transport's water supply is limited and must be carefully rationed. With thousands of men using it, little water can be wasted.

Boat drills take up some time. Soldiers practice getting to their boat stations in the darkness of a blacked-out ship. When H-hour comes they will have no lights to guide them. They must know the labyrinth of the ship's passages, from the troop quarters to the boat deck, and they must be able to get to those stations in a hurry.

They have drilled in this on other transports during their training period when they crawled down nets slung over the port and starboard sides and dropped into waiting landing craft below. They have been taught how to go over the side and down the net in full battle dress, how to grip the vertical, instead of the horizontal, strands of the rope net so that the man above won't step on their fingers. They have been trained in all the major and minor items that make up an amphibious landing.

Transport life slips into a limbo of routine and waiting; of breakfast, lunch, and dinner; of work, play, and sleep. Play is largely gambling in its various forms. No money is seen, but it passes hands just the same, and the stakes are big. These men have the biggest gamble of their lives just ahead of them; so money doesn't mean very much now. Guns

are polished, cleaned, and polished again. Knives are whetted and well-worn books pass from reader to reader.

On D minus 1, the day before the attack, the men are told their destination. Last-minute plans are checked, and intelligence information is passed out.

That night the convoy turns, and the mass of ships move in to their anchorage. From the side of one transport a small boat is lowered slowly into the water. Dark figures grip the rope net, swing over the rail, and feel their way down the rungs into the boat. The success of all the landing boats to follow depends on the navigation and seamanship of the scouts in this little craft. Its destination is an unmarked spot in the dark water somewhere out in the distance. The troops are going to land somewhere north of this spot. The scouts must locate the position, remain there, and guide the waves of assault boats to shore.

By this time the moon is down. Aboard the transports the low mumble of men working in darkness can be heard. Troops' quarters are empty. The men, armed and equipped, are filing up passages and standing at their boat loading stations. The low whine of steel cable against pulley is the sound of landing craft being lowered. Some boats are already in the water, moving in wide circles, their motors muffled, ready to pull in to the foot of the net when signaled.

A quiet order is given, and four soldiers make a dark silhouette as they start over the side and down the net. Four more follow, and four more. Down they come in steady columns, filling the boats below. One by one the transports pass the word to the flagship.

"All boats off."

The last transport reports. Then the order is given.

"Boats away. Go in."

This is the signal for the waiting warships, the cruisers, the destroyers, and all the others. A blanket of fire leaves their big guns and splashes over the beach. It's the job of the big guns to pulverize the beaches, then, just before the troops land, to lift their fire beyond the beaches. Perfect timing all around is necessary. The barrage must lift before the troops land, but not soon enough to allow the enemy defending the beach an opportunity to take advantage of the lull and remain his positions on the shore.

A few moments after the naval gunfire starts, the first boats slide by the scout boat, get their bearings, and shoot into shore. Another wave passes, then another. Up and down the beaches come a steady stream of snub-nosed assault craft, landing soldiers and returning for more.

Daylight brings the LST's and LCIL's with heavy equipment and more cargo. The invasion is under way, but it is by no means secure yet. These men ashore must have more equipment and supplies to stay there.

All the parts of the Amphibious Team are meshing into high gear. The Hydrographic Group has surveyed the shore line for underwater obstacles and beaches suitable for landing LST's and LCIL's. These beaches have been marked.

The Beach Medical Battalion has set up a unit out of fire range. It is bringing in the wounded, applying splints, dressings, and loading the injured on boats to return to the transports.

The communication teams are working. They have set up message centers and are keeping contact with land, sea, and air groups. The Beach Party on shore is directing the

steady shuttle of boats, unloading the transport cargo, dispersing it along the shore, and routing it inland.

Somewhere back of the shore line are more Navy officers with Army units. These are the Naval Gunfire Liaison Officers. They are calling for, and directing, the fire of the big Navy guns at targets the Army wants annihilated. These Navy men have found observation posts, a tree, a tower, or a high hill and are controlling their shots with a short-wave radio. In the air are scout planes and bombers doing the same thing, spotting, bombing, and directing fire within the intricate web of amphibious communications.

It is hard to see the pattern of war around you when things are happening as fast as they do during an invasion. When the job is finished it has been so hectic that men are prone to say, "To hell with what made it. We did it. The job's done."

But behind that job lies a pattern of unbelievably intricate planning, the movement of thousands of men and millions of tons of material assembled from hundreds of war ports. It means split-second timing to arrive at a place on an hour called "H." It means the manipulation and direction and control of this power in a way to land it where the enemy isn't expecting it. It's cooperation, in the fullest application of the word's meaning, not only between the men who draw a sight down a gun barrel, but also between the services. It means not only the men of action, but also the men left behind, the men who built, trained, and planned.

Very little was said or written about the Amphibious Force following the North African invasion. There were

many things still to be tried for the first time and many more invasions yet to come.

But since that November Sunday in 1942, the news that "our troops have landed" has flashed across the nation almost 30 times. The following pages have been an attempt to tell part of the story behind that communiqué line.

This Most Difficult Warfare

WELL, we'll soon have our schedule down to an invasion every 3 days!"

That's what one sailor said after he heard the news of the Admiralty Island landings, the fourth in as many weeks during the month of February, 1944.

Two years earlier, February, 1942, amphibious war was a new term, as unknown to most people as the contents of the King of England's breakfast menu. But everyone saw the results of amphibious war in the Pacific. They had seen pictures of the Japs coming in to Philippine shores in barges. They had watched and pin-stuck maps as the Japs' fluid drive spread south. All this had been seen with but perhaps scant appreciation of tactics involved.

It was stark clear to some military minds how the Jap was closing in on island after island. It was clearer still when consideration was given to the retaking of these islands in the future, especially since "future" meant that the Jap would have ample time to fortify, strengthen, and supply these areas.

Singapore fell. Java fell. The Japs moved south. And the German Army was in North Africa. Wherever the Al-

lies struck, whenever we were prepared to shift from defense to assault, the blow would have to be water-borne.

This point was hammered home to the press and the people on the afternoon of March 11. The man who did it was Admiral Thomas C. Hart. He was back from the Philippines and the Dutch Navy in Java with a message. It was Secretary Knox's weekly press conference. Admiral Hart was sunbrowned and tired as he faced the roomful of correspondents. He had a story to tell and he minced no words.

"The Pacific campaign has been and will continue to be," said Admiral Hart, "one of amphibious war, this most difficult and least known variety of warfare."

The stories that resulted from this press conference were good. It was a firsthand account of the retreat from the Philippines and the losing battle for Java and the Dutch East Indies. It made good reading. But it also accented a fact already unpleasantly clear to the war planners: this amphibious warfare *was* the least known variety.

Lights had burned late many nights in a small 20 by 20 room in the old Munitions Building facing Constitution Avenue. Men sitting around the U-shaped table had made one decision, an obvious and easy one: we must have an Amphibious Force of some kind. But the correlated problems: of what will it consist, how will it be done, and who will do it were more brow-wrinkling than a crossword puzzle in Arabic.

There was the factor of time to be considered. Such a force not only had to be organized, it had to be trained and equipped, and quickly. There was no handy reference book or War College course to turn to for training. There

was no equipment depot or quartermaster with supplies for amphibious warfare. It was like a man in a deep well, without rope or ladder, being told he had just 10 minutes to get himself out of that well, or else. . . .

With a review of what little amphibious experience American forces had behind them, perhaps a few rungs of a ladder could be built. The men taking this inventory turned first to the Marine Corps and the Navy. Both had some experience, but not on the scale now demanded.

The Navy's first amphibious experience had been a joint effort with the Marines. In nearly every campaign in which the Navy had participated, Marine units had landed on enemy shores under covering naval gunfire. Usually, however, in these landings, the troop forces were assembled from Marines of the ship's detachment and had little coaching in the refined art of landing on a defended beach. Specialized assault training within the Marine Corps had begun as early as 1902, and by 1914 considerable progress had been made in the training and equipping of advance base brigades. The First World War halted this particular type of training and it was discontinued until 1924, when the Fifth Marines were sent to Panama on maneuvers. At the same time, the east coast Expeditionary Force from Quantico was making practice landings on the island of Culebra. The following year, 1925, a joint Army-Navy maneuver was held on the island of Oahu, Hawaii.

It was not until 1933 that an organized landing force was created within the Marine Corps. This was the Fleet Marine Force. In 1935 the Fleet Marine Force and the Navy began a series of joint landing exercises which were completed in 1939.

The Army's amphibious assets lay largely with the corps of engineers which had trained small-boat men who were familiar with the ways of water. In the winter of 1939, after the Navy had finished its last exercises with the Marines, an independent Army amphibious program was getting under way on the west coast with the 3rd Division. Guiding the soldiers through the mysteries of assault by sea was General Frank Keating with 4½ years of experience in Hawaii and still more in the Philippines.

Fort Lewis, Washington, near Puget Sound, was the incubator for the general's amphibious theories. Equipment was scarce and makeshift. This, remember, was the era of "simulation" and "simulation" was the gag line of all wisecracks. These were the days when Ford half-ton trucks labeled "tank" played at war against wooden guns, and engineer pontoons were paddled as war canoes to represent motor-driven landing craft.

In Fort Lewis was a body of water, American Lake. This lake, and a small, flat meadow near by, were to be the scene of some strange sights, strange even to a master sergeant whose service marks bore witness to years of Army improvising.

It was General Keating's plan to give his men some basic amphibious training. Boats were needed for this, but there were no boats at Fort Lewis. There was the lake, perfect for amphibious training, but no boats. Not to be outclassed by other labelers, the general looked over the few acres of flat meadowland and gave some orders. On one side of the field was an embankment 15 or 20 feet high. The next day carpenters brought out white-pine boards, and curious eyes watched them saw and hammer the lumber into a little

grandstand on the ridge. On the other side of the field men brought out bundles of wooden stakes, sharpened the points, and drove them into the ground.

The general was almost ready to explain what this was all about, but he seemed to be waiting for one more thing. A string of Army trucks bumped down the road and parked, out of sight, beyond the row of stakes. Then came the explanation. Without hint of a smile, General Keating explained:

"That row of stakes," he said, pointing to what looked like a stubby picket fence across the field, "is the water line of the enemy beach. When I signal, trucks will come down the field toward the stakes. They don't look like it, but they're boats, landing craft for an assault on that beach. Now we'll show you how an enemy beach should be approached and taken."

The general walked over to the little pine bleacher, climbed up, and sat down. From this point he, and his students, had an unobstructed view of the entire field. The officer in charge of the demonstration gave the signal to begin.

To start this mountain-meadow training, it was necessary to show the green 3rd Division troops what a beach assault looked like. The first demonstration was about to take place. The men in the trucks were the demonstration team that the general had formed from the 15th Infantry.

At the signal the trucks roared out of hiding, across the meadow, throwing up a wake of dust and yellow mustard flowers instead of salt water. The vehicles moved singly or in tandem, but each one represented a landing craft. They entered the meadow in typical approach formation. As they

neared the line of white stakes they went into a V formation and shot into the "beach" in waves. The men jumped from the trucks, as they would from a landing craft, and rushed the "beach." While this was going on, the instructor would explain to his group what was taking place and outline the tactical reason for doing so.

As each wave of trucks debarked the men on the "beach," they wheeled about and retraced their route back to the assembly area exactly as boats retract and return to the transport area.

When the team had completed its demonstration, the students would join their units and go through the same attack with their own equipment.

This was the first of the alfalfa assaults.

With a little imagination on the part of the soldiers and much coaching they got the idea. With trucks for boats and a meadow for a beach they were shown the correct method of approaching an enemy shore, how to land, spread out to make smaller targets, and how to keep a steady stream of supplies coming in to the troops that had landed.

This was the first part of the training cycle. But it gave the troops no feeling of being on water regardless of vivid imaginations. The boys would have to get their feet wet before they'd really understand.

As soon as each battalion finished its "alfalfa assault" it was taken down to American Lake, where the men used floats and engineer pontoons to get the feel of actually being on water. These floats were ponderous things, about 20 feet square with a 20-foot tower and upper platform. They were floated on empty 50-gallon drums. The upper platform of the tower was designed to hold one platoon of

riflemen or heavy weapons. The debarkation stations were reached by a narrow footbridge from the shore to the float and by climbing vertical ladders through a trap door to the upper platform, which represented the deck of a transport. Two scaling walls were built on these towers, and suspended from these were 30-foot cargo nets.

"Now you're coming over the side of a transport," the instructor would shout to his men on the deck. "Climb down, drop into this 'landing craft,' " he would point to an Army assault boat, a little larger than a rowboat, "and go like hell for the beaches."

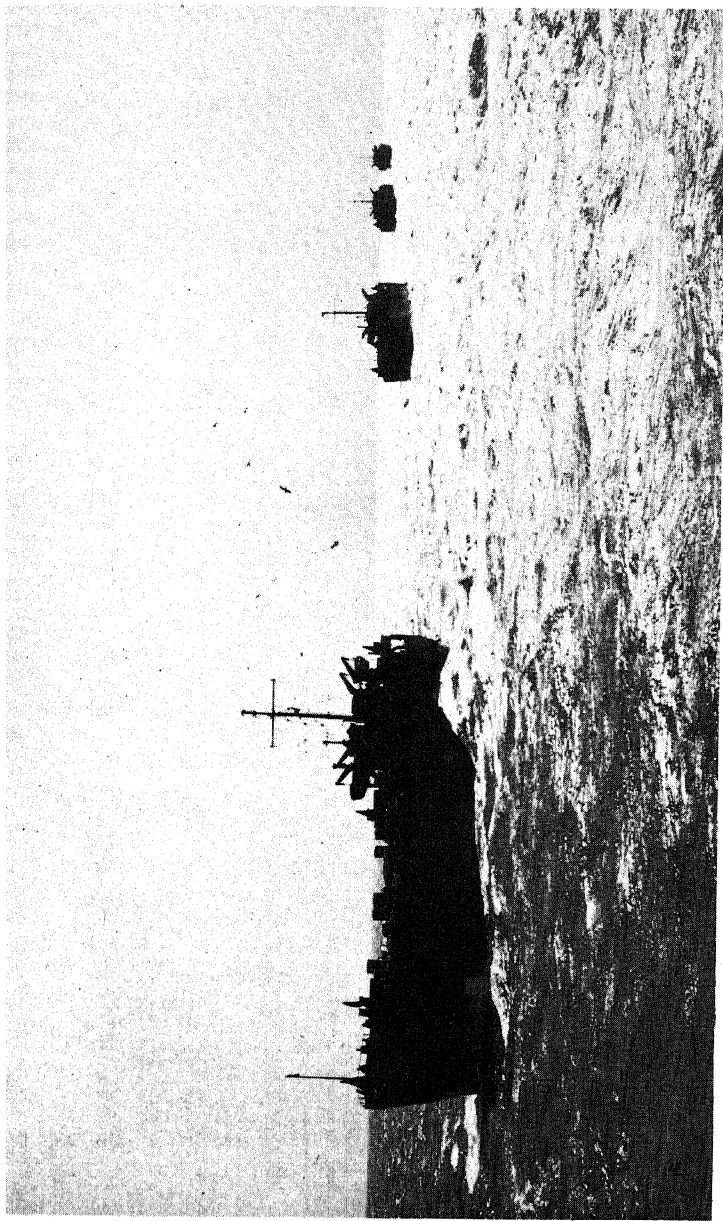
These small boats were always paddled. Even sufficient outboard motors were not available.

Training under these conditions was ragged, but the entire 3rd Division was oriented and conditioned in basic amphibious assault and theory.

The division was scheduled to leave for San Pedro, California, in January for a joint maneuver with the Navy. A few days before they left a couple of honest-to-god boats arrived at Fort Lewis, which provided a wet-run before joining the Navy units.

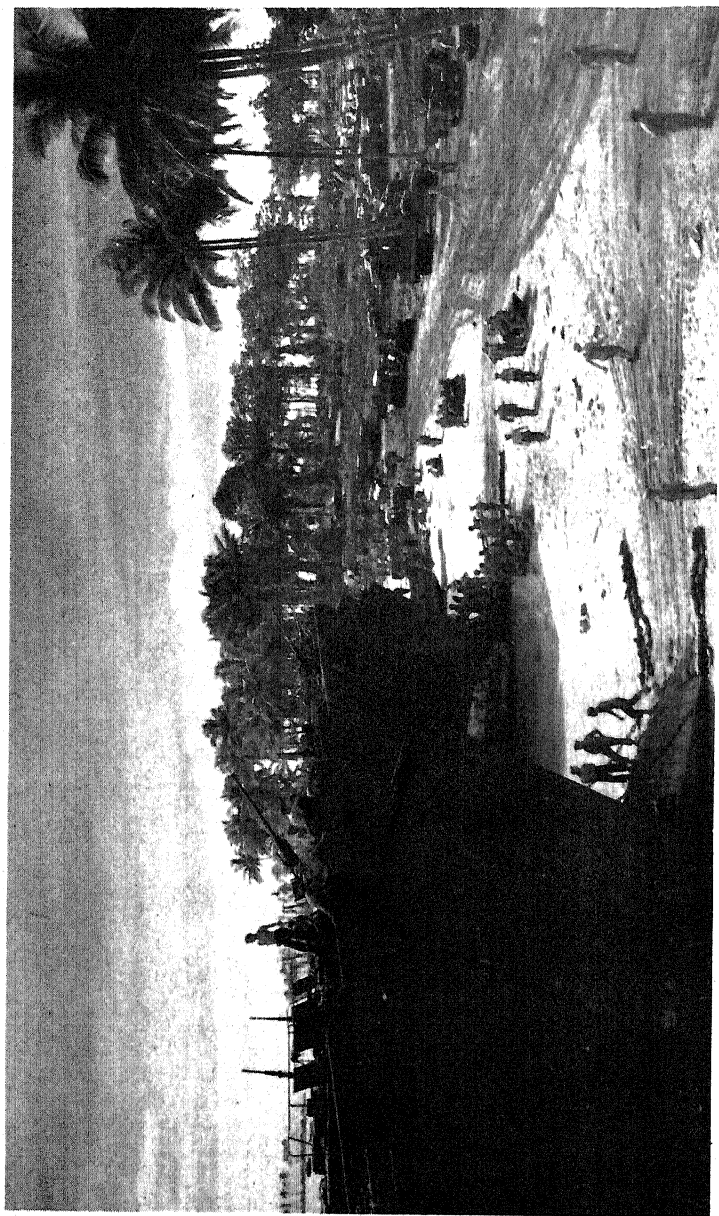
The troops left for San Pedro, Christmas Eve, 1939, and returned in May, 1940, with many credit hours of training with the Navy. But the division was ordered to reorganize, and further amphibious training was postponed until fall.

The first sizable joint amphibious exercise which at all resembled our current conception of such an operation was scheduled for early winter of 1941. Participating in this was the Army's 1st Division and the Marine 1st Division. Commanding the Navy forces was Admiral E. J. King, then CINCLANT (Command in Chief United States Atlantic



Official U. S. Navy Photograph

BY SEA



Official U. S. Navy Photograph

BY LAND—BOUGAINVILLE BEACH

Fleet). The Army complement was under the direction of Brigadier General James G. Ord. The entire landing operations were to be under the command of Major General Holland M. Smith of the Marine Corps.

This was the first joint maneuver entailing Army, Navy, and Marine Forces. Included were many men later to be key figures in the Atlantic Fleet Amphibious Force. Among them were: Captain Lee P. Johnson, Commanding Officer of the USS *Tuscaloosa*, later to be in command of the Amphibious Force; Captain R. R. M. Emmet, who was to be Commander Transports for the force and a participant in the North African invasion; and Colonel William D. Paschal, who became General Keating's Chief of Staff.

The Army units sailed from New York in late January, 1941, on Army transports. The executive officer was Lieutenant Colonel Adrian St. John who had been an observer attached to the 3rd Division when it was training on the meadow under General Keating.

Landing craft used in this exercise was a motley array of various types: A, B, and C types, the "bureau boat" (a metal craft not too seaworthy), motor launches from the escorting naval ships, and the personal gig of Captain Johnson which he had donated to the cause from the USS *Tuscaloosa*. These were personnel craft only. They had no ramps. When the boats beached, the troops crawled over the gunwales, dropped into the water, and waded ashore.

The first type of Higgins boat used by the Army was tried in this exercise. The Higgins boats had been delivered to the dock in New York. Shipped out of New Orleans in warm weather, someone forgot to drain the water, so that when they arrived in New York a number of engine blocks

were frozen. A lot of time going south on maneuvers was spent on those engine blocks.

This was also the first time that transports were used in a joint operation on the east coast. There was much to learn in the preparation of a transport for assault. The Brooklyn Army Base had built some cradles for stowage of Higgins boats on the forward and after decks. Boats were nestled, or jammed would be a more appropriate word, on these cradles placed athwartships, as tightly as possible. Booms were rigged to sling the boats over the side for debarking troops.

The transports themselves were captained by Army Transport skippers. They were civilians, civil-service appointees, from the merchant marine. They wore a blue uniform with the Special Army Transportation insignia.

Colonel Paschal's skipper was 2 weeks new on his ship when they sailed.

"Every time we went out on a sortie," the colonel said, "the old man aged 5 years. He had no formation experience, particularly at night, and the problems of blacking out his ship seemed insurmountable. However, most of the Army were also novices in what we were doing. We all learned a lot. We had excellent cooperation from both General Smith's and Admiral King's Staffs."

The inventory on amphibious experience was brief, assets not too cohesive or complete, but at least what we did have held promise. It also showed the tremendous task of training, equipping, and organizing to be done before our amphibious strength could be used. The need of a unified command was apparent. This decision had been reached in late

February, 1942, by President Roosevelt and the Joint Chiefs of Staff, and the man chosen to organize the nucleus of the first Amphibious Force was Rear Admiral Roland M. Brainard.

A few days after this appointment, Commodore, then Captain, Lee P. Johnson left command of the USS *Tuscaloosa* and reported to the Navy Department in Washington. He was walking down one of the newly painted, endless corridors in the Department when he saw Admiral Brainard.

"Johnson," Admiral Brainard said, "you're my new Chief of Staff. Come into my office."

Captain Johnson followed the admiral into the office, more stunned than pleased at the sudden news. Admiral Brainard picked up the telephone, called the Navy's Bureau of Personnel, and 5 minutes later the verbal appointment was a fact.

"Now get me a staff," were Admiral Brainard's next words.

Captain Johnson had many an opportunity in the following days to ponder the speedy fruition of the admiral's call to BuPers.

"I started with a list of six likely candidates," the Captain said, "but that's about as far as I got for what seemed like days."

Ten days to be exact, 10 days of receiving the inevitable answer to requests for personnel, "Negative, can't be spared from his present job." Finally, one by one, candidates for the new staff were slowly confirmed by the all-powerful BuPers. On Friday afternoon, March 13, dispatch orders went out from Washington to eight men. The next day,

March 14, 1942, Admiral Brainard directed that his flag be hoisted without ceremony on his transport.

The Atlantic Fleet Amphibious Force had been created, one ship and a staff of eight men.

America's first major amphibious invasion was 7 short months away.

Building 138

THE Atlantic Fleet Amphibious Force had been activated.

In rough terms, when a military unit is “activated” it is ready to take orders and plan for action.

“To us,” someone in the force said, “it was like putting Don Quixote on a sea urchin with orders to bring back a whale.”

What activation really meant was a series of windmill battles with discouragement and confusion, achievement and success against outrageous odds, and a period of organizing disjointed separate military groups. Day and night planning ranged from how to feed 1,000 men on a new base with only Civil War field kitchens, to training coxswains to bring landing craft ashore in pitch-black night. It meant coordination of training both soldier and sailor. It meant getting equipment where no equipment existed, of ordering boats direct from the draftsman’s board, unseen, untested. It was a gamble in essential material, vital time.

This was the first move to unify Army and Navy amphibious experience and equipment. It was like fitting together the parts of a giant jigsaw puzzle, parts whose edges

had never been clearly cut, some entirely missing, and the complete pattern itself virtually unknown.

This fitting together began on March 16, 1942, when the first eight members of the Amphibious Force staff reported to the Naval Operating Base, Norfolk, Virginia.

There is another military term which has more ramifications than an onion has layers. It's "security," and it means secrecy, "Don't let the enemy know what we're doing." The cold hand of security clamped around the Amphibious Force, with the warning, above all, "Don't let the enemy or anyone else know what we're doing in the preparation for amphibious fighting." This was necessary; otherwise we would lose one of our major weapons, surprise. It was not until October and November, 1943, that newspaper correspondents were allowed to visit and write about amphibious training bases.

This shroud of security around the force was so tightly drawn that it was virtually kept a secret from those who worked in it during the early Norfolk days.

The new staff arrived on the base on time, but no one could direct them to the headquarters of the Amphibious Force. Perhaps it is fitting that the location of the new force should have been somewhat of a mystery. For most of the eight staff men their first day's work in the force was an office-to-office canvass of the base with the question, "Where do I report?"

One by one they got the answer, "Building 138." As each man reported to Building 138 he kept his first impression locked within his official self.

Building 138 was not a staff officer's dream. It was a two-story wooden shack, painted the color of mashed grass,

lying between the receiving station prison and an old sub base north of Pier 7. The windows, what few there were, looked out upon the murky, ship-dirtied harbor waters of Hampton Roads. Near by was another building, housing the Landing Force Equipment Depot, which was to grow hand-in-hand with the force.

It might have been clever to think of concealing the secret Amphibious Force headquarters in a little wooden building. But this was not the reason for its selection. There was no other building available.

Captain Johnson was waiting in Building 138 to greet his staff as it reported. His welcome was more warm-hearted and explanatory than the usual official "Glad to have you aboard." When the men saw the inside of the building they would need something of a chaplain's pat on the shoulder and a word for courage under fire.

It was like the Joads moving in on country cousins. Another Navy unit with a long name, The Subordinate Command Service Force Atlantic Fleet, was already occupying 138. As a friendly gesture of one officer to another in need of working space, this unit had merely compressed its desks and yeomen on one side of the first floor, leaving the Amphibious Force a corner of the room. But there was more available space than appeared at first glance. Several doors opened from this corner of the room. They were bathrooms, toilets, and a little bedroom. A small desk was squeezed into each bathroom, two desks were pressed together in the bedroom, and the others, with hardly passageway between them, were in the corner of the first floor. Thumbtacks made little bright pimples on the beaverboard walls. The light-oak government desks were scratched and worn. Wet clothes,

carbon paper, and the odor of a heated wooden building blended into an office-barracks room smell.

When the staff had assembled, the captain said, "Well, gentlemen, here we are at last. We can get to work now."

At first Captain Johnson's invitation to "work" resolved into a 90:10 ratio; 90 per cent of the time was spent in trying to get office equipment and arranging it within the space limits, and 10 per cent in the actual work of war planning.

No one on the staff considered himself an amphibious expert. Everyone immediately began to read all available reports on ship-to-shore exercises. In a row of cabinets was a set of files on transports that the Service Force had kept. These were avidly studied. Office hours were from 7 in the morning until 11 at night with no days off. Other files were read and records of past maneuvers were studied.

This period was, in fact, rather like the commissioning of a new ship and a shakedown cruise. The staff was settling into position, new officers reported, and the force began to take on shape. It was understood that this was a fighting staff, whose mission was to prepare plans for an amphibious operation.

The staff ate at the base and lived in the Chamberlain Hotel, across the Roads, which had been leased by the Navy. For transportation across the Roads, a landing craft was borrowed from the equipment depot next door. Another landing craft was borrowed. This was to be Admiral Brinard's barge. Every admiral has a boat for his personal use. Regardless of type or what the boat looks like, it's always called the "admiral's barge."

Lieutenant Phillips, the flag lieutenant, with a crew of

enlisted men and ship's fitters, built a small cabin, covered the open deck of the landing craft, repainted it, decked it out with white canvas tassels, and christened it the *LCB* (Landing Craft Brainard).

With all its growing pains, the force worked and swelled with hyperthyroid speed. Security became tighter. The address of the Atlantic Fleet Amphibious Force was "c/o Postmaster, New York City." Few people on the naval base or elsewhere knew of the force or its purpose. Those who did were hard put to realize its permanency. But we were still a long, long way to Port Lyautey.

In April, Admiral Bristol died in Argentina. Admiral Brainard was given the third star of a Vice Admiral to take over that command and Rear Admiral Henry K. Hewitt became Commanding Officer of the Atlantic Fleet Amphibious Force.

It was a southern April day when Captain Johnson and Lieutenant Phillips drove out to the Naval Air Station in Norfolk to meet their new boss, Admiral Hewitt.

During the drive back from the air station to Building 138, the admiral was given a quick review of the AFAF status and, to a degree, warned about what to expect in the way of an office. However, the warning was insufficient. Admiral Hewitt had been smoking a pipe, which he held in his hand when he entered the door at 138.

"This is your desk, sir," said Captain Johnson.

The admiral looked. His desk was jammed tightly against the wall, phalanxed by the desks of Communications, Operations, Intelligence, Material, and yeomen desks for each of these. The admiral said nothing, but in his astonishment, he replaced his pipe in his mouth, bowl first.

In the meantime, the Army pieces of the invasion jigsaw were taking shape in outlying parts of the country.

One question which arose in the Joint Chiefs of Staff's February meeting was who would man the invasion craft used by American forces. Would it be Army or Navy? Since the Army Engineers' Amphibian Brigades were experienced small-boat men, the engineers volunteered to embark upon an extensive training program for additional amphibian brigades. These units would fill two requirements. They would man the small assault boats, that is steer them and do the navigation; and they would be responsible also for getting supplies ashore for the troops that had landed. The engineers began to organize these amphibian brigades in April and May of 1942.

While this was getting under way, General Frank Keating was working out new tactical theories and problems indigenous to amphibious warfare for an over-all Army training program. The general was staying at the Army War College in Washington. He was sitting on one of the balconies that hang in tiers like the boxes at the Paris Opera House, the day he received the training order, wondering how this assignment was going to be solved. He had been given carte-blanche authority to call on any man in the Army for what he wanted. At this time he was working with General Mark Clark, Chief of Staff of the Army Ground Forces.

The question in General Keating's mind was, what exactly did he want, or need. Amphibious warfare had hardly polenized. Landings had been made; the Army had worked with the Navy and Marine Corps in amphibious problems; but this was to be amphibious war on a scale that left

planners, who faced its tremendous problems with little else than ideas, a bit breathless.

The only thing to do was to analyze previous amphibious work, and upon that base the curriculum for the new training program.

Before coming to Washington in the spring of 1942, General Keating had been working with the chief of staff of the 2nd Division at Fort Sam Houston, San Antonio, Texas.

One midmorning the desk phone rang. It was a long-distance call from the War Department in Washington.

"Report at once to Washington, to General Mark Clark's office."

Neither General Keating nor his division commander, Major General John C. H. Lee, knew the precise nature of this summons. Orders were written and 2 hours later General Keating was on a plane bound for Washington, expecting to be gone a few days.

He arrived in the Capital the following morning and reported to General Clark's office. General Clark was familiar with General Keating's interest and background in amphibious training, having been G-3 of the 3rd Division when General Keating was routing his boys from meadow to lake, experimenting and teaching what had then been considered basic principles of amphibious landings. It was noted that under General Keating's discerning eye, principles remained "basic" only if they worked. It was this military pragmatism that had caught General Clark's interest and was the bid for the much bigger job now assigned to General Keating.

The Washington interview was short.

"It looks as if we're going into this amphibious thing on a scale much bigger than we ever expected," General Clark said. "I'd like you to go along with a site board that has been selected to look for suitable land to build training bases along the eastern coast. I'll let you know the word when the board is ready to go."

After a great deal of swamp tramping and flying along the eastern seaboard, a camp site was chosen in the Carrabelle, Florida, area. The War Department had ordered that training be under way by July 15. This was April. Even by starting construction immediately the Carrabelle camp couldn't be finished before September. In the interim a temporary site had to be provided for the scheduled July 15 training. General Keating remembered a beach area about 7 miles from Camp Edwards, Massachusetts. This would serve as a temporary base.

The training curriculum for this temporary organization was what puzzled the general the day he sat on the balcony of the Army War College in Washington.

He began figuring on a basis of hours, as if he were outlining a course for a college freshman, only this course was to be 2 weeks long instead of 2 leisurely semesters. On a schedule of 10 study hours a day, the 2-week course would consist of 144 hours. On this basis, he began to apportion hours to study courses.

At this point he remembered a rather important fact; he had no faculty for this college of amphibious knowledge, and it would take time to secure and organize one. This was the end of the balcony planning period.

He went to General Clark's office.

"I think I can organize this training center with about 50 enlisted men and 14 officers," he said.

"All right," answered General Clark, "that's reasonable enough. Get them immediately."

"Whom do you want?"

"Whom do you know?" was the answer.

Several names occurred to General Keating, including Colonel George P. Lynch, and Colonel Peter T. Wolfe, both of whom were ordered immediately.

Colonel Wolfe was the first to arrive. He was given the task of administrative planning, while General Keating began working on a curriculum. Together, they mapped on paper what looked like a satisfactory course of instruction.

The next step was to get it approved. After some delay, with no word of approval forthcoming from the War Department, General Keating and Colonel Wolfe decided to go to Washington to investigate. After the first day of office shuttling, they were walking down a corridor in late afternoon when Colonel Wolfe said in desperation,

"We'll never get this damned thing approved at this rate."

"I have an idea," said General Keating. "I think I know where to go."

They walked down the corridor, turned into another hall, and opened a door.

"Well, what are you fellows doing here?" It was General Eisenhower, whom General Keating had known in the Philippines. "Come on in and cool off. You look mad. What's the trouble?"

The problem of the unapproved organization chart was explained. General Eisenhower reached for the phone. An

hour later, General Keating had his approval, written in the longhand of a major general.

It was Sunday, June 14, when General Keating and Colonel Wolfe returned to Camp Edwards. Part of their faculty had already arrived. Carpenters were constructing temporary buildings. Unpainted, pine-board classrooms glistened white along new company streets. Signs pointed the way to equally new and bare latrines. Rows of barracks were strutting bare joists and open rafters. Dishes were already rattling in the new mess hall.

The next day the rest of the faculty arrived. The general had exactly 1 month in which to shake down, organize, and begin training of troops in amphibious work.

On the first of his 30 days' grace, he called the faculty to a meeting.

"The first thing I want you men to know is this," he said. "We're not going to take one step in this program until we decide upon a set of logical principles and doctrines governing amphibious warfare."

The meeting was dismissed with an order.

"Go into hiding and come out with an outline of what you think we should teach."

The teaching staff went into a huddle. When they emerged they had a uniform plan of what to teach. Most of the principles that resulted from that session of teachers are, with a few exceptions, as sound today as they were then.

The hardest single thing to ensure at this embryonic stage was consistency of thought within the faculty. There could

be no individuality. It was a training team and the facets of each instructor's course of training had to be molded toward a unified end, complete amphibious training.

"Confidence is a weapon," the general said. "We have to instill confidence in the right way."

The procedure for this was to require every instructor to prepare rough charts and write his complete lecture. When he stated that he was ready for review the instructor came before what the general called his "murder board." This board consisted of the executive officer, the heads of the various departments, and General Keating. The murder board demanded a high standard and they got it, although the price they paid was listening to lectures over and over again until they were perfect.

By 8 o'clock on the morning of July 15, the school was ready, the troop audience waiting, and the faculty confident. The Army training program was under way.

Back in Building 138 the Atlantic Fleet Amphibious Force had gone into high gear. Planning had started in June for a major invasion, although few men knew that it would be North Africa.

An Army staff now joined Admiral Hewitt's staff in the green building that bulged with more life than a guinea-pig hutch.

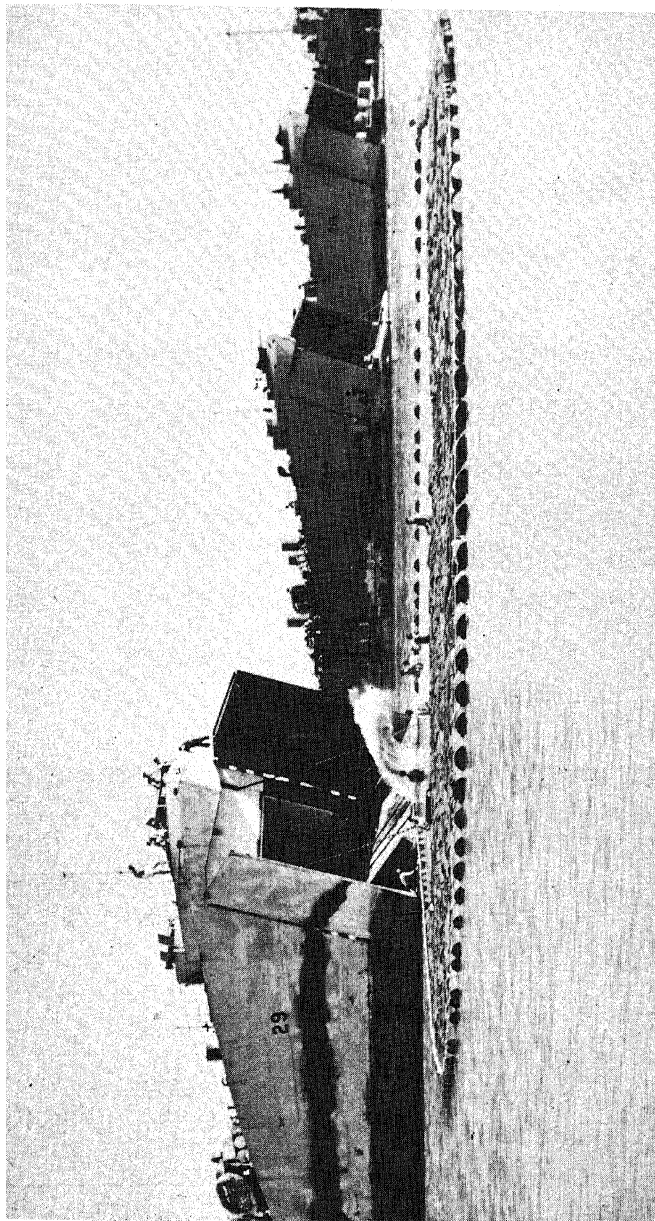
In July came hint of a major shift. After the formation of the Atlantic Fleet Amphibious Force, which was designed as an Army-Navy team, the Marines under General Holland Smith continued amphibious exercises along the Atlantic coast. Now came word that all Marine amphibious activity would move to the west coast.

The change occurred in August. The Marines moved west to form the Pacific Fleet Amphibious Force under Rear Admiral Francis W. Rockwell, leaving only Army and Navy components of the Amphibious Force in the east.

This shift was due more or less to general war strategy. The Marines were trained as a striking force, to land, secure the beaches, and hold them until the occupying Army forces arrived to take over and relieve; at which time the Marine forces would withdraw, rest, and become available for another thrust. The Atlantic and European strategy differed. In North Africa and the Mediterranean when the Army landed, it landed to fight a campaign.

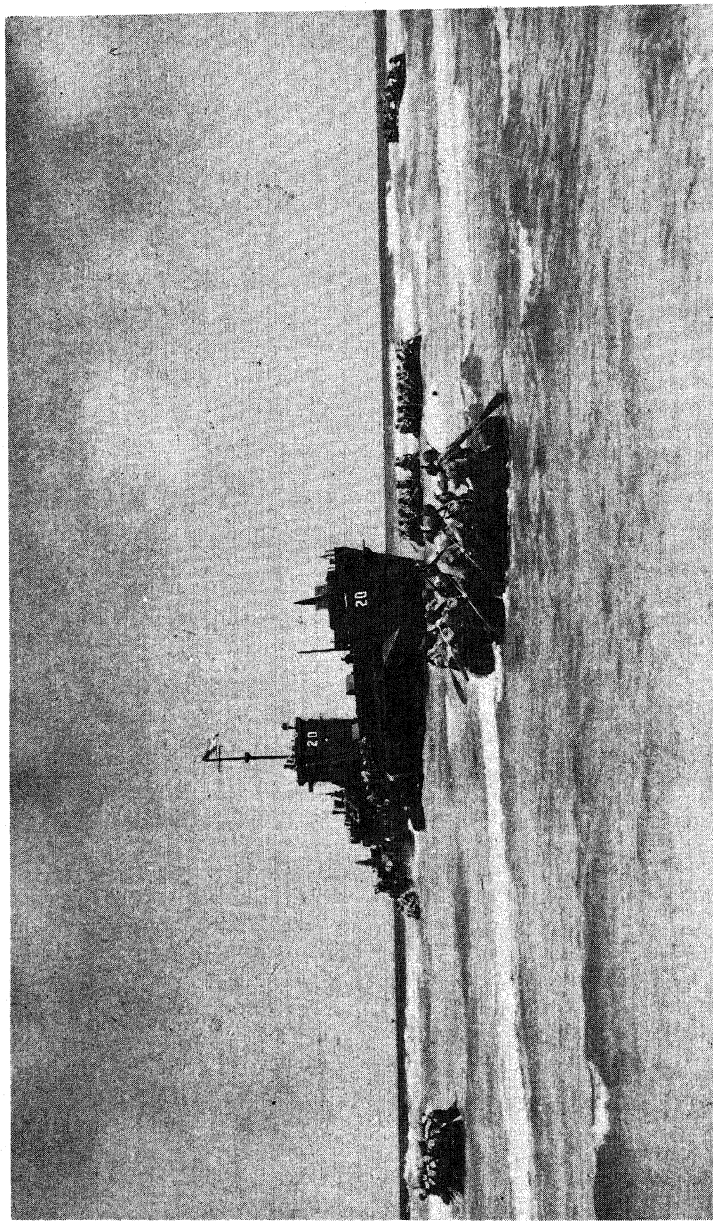
The Atlantic Fleet Amphibious Force rushed training for the impending invasion. The 3rd Division was ordered east. The 9th Division finished training. The 2nd Armored Division came for its amphibious tutoring. The 72nd Signal Company was ordered east to join the 71st Signal Company Special at Camp Pickett, Virginia.

Building 138 now resembled something of an Olson-Johnson crazy house. Generals and admirals rubbed stars as they pressed into the little space for conferences. Meetings were halted and conversation punctuated by a Yard railway 6 feet from the windows. Diesel engines, squealing wheels on iron rails, the switching of cars, and the unloading of freight, all within whispering distance of 138 were poor sedatives for taut nerves. Even the endless sight of invasion craft passing the window on freight cars bound for the equipment depot was light aspirin for the collective headaches.



Official U. S. Navy Photograph

FUEL FOR TROOPS ON APAMAMA ATOLL IN THE GILBERTS. THESE DRUMS OF GASOLINE BEING UNLOADED FROM LST'S WILL BE TIED IN A CIRCULAR RAFT AND TOWED TO THE SUPPLY DUMP ON THE BEACH.



Official U. S. Navy Photograph

TROOPS LEAVING LCIL IN LCR'S

In September, the force moved. A contract was signed for the old stucco-Moorish Nansemond Hotel, 7 miles away in Ocean View. After a 3-day fumigation attack on the Nansemond cockroaches, the Amphibious Force headquarters left Building 138.

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The Ships That Land Them

FROM across the seas of two hemispheres they came, anonymous, strange-shaped invasion craft known simply as LST's and LCIL's—16,000 miles from our east coast to Vella Lavella in the Solomons; 5,000 miles across the Atlantic to Sicily, to Salerno; up the Pacific coast to Attu, Kiska, and on to Rendova, belching tanks and invasion troops to blast a surprised enemy.

This was America's secret weapon, and the enemy *was* surprised. An English-speaking Sicilian ship broker, who had traveled in England and America, refused to believe what he saw—the shores of Sicily black with the beached bows of LST's.

"I thought they were transports," he said to an Allied officer, "loaded with high explosives, to be abandoned and set off like giant land mines to blow the island out of the Mediterranean."

It is true, high explosives filled those ships, but the cargo was to be unloaded, the ships backed off the beach to come back again and again. They would come back in the Mediterranean, in the Pacific, wherever American troops would fight their way ashore.

The construction of America's amphibious invasion fleet,

the small craft that invaded North Africa and the larger LST's and LCIL's that joined them beginning with the Sicilian invasion, is the story of builders, planners, and workmen who met impossible schedules on time.

The invasion fleet divides itself according to size into two brackets of large and small craft. The division of large ships includes the LST (Landing Ship Tank), the LCIL (Landing Craft Infantry Large), and the LSD (Landing Ship Dock). These were developed originally by the British for cross-Channel runs.

The small family of the fleet includes: LCT's (Landing Craft Tank); LCM's (Landing Craft Mechanized); LCV's (Landing Craft Vehicle); LCVPR's (Landing Craft Vehicle Personnel Ramp); and LCR's (Landing Craft Rubber); LVT (Landing Vehicle Tracked); LCS (Landing Craft Support). These are primarily of American design for ship-to-shore traffic.

Shortly after the First World War the Navy began experimenting and developing personnel landing craft for the use of Marine landing forces. By the winter of 1935-1936 the Bureau of Construction and Repair, which later became part of the Navy's Bureau of Ships, had designed various types of personnel landing craft to be carried on boat davits of troopships and other auxiliary vessels. These craft were to be used for landing troops and cargo where pier or dock facilities were not available. Testing of these boats began in the fall of 1936.

One 30-foot boat to be tested was designed after the "Jersey sea skiff," a snub-nosed, flat-bottomed boat used by fishermen along the Jersey coast. It was especially adapted for launching and beaching in the surf.

None of the designs proved to be as successful, however, as the Eureka model of a craft built by A. J. Higgins in New Orleans. This was a spoon-nosed, flat-bottomed boat without ramp. After sufficient testing, design was frozen on this 30-foot Higgins boat in May, 1940, and it was given the designation of X boat.

From the X boat design came the later craft to be known as the LCVPR. For this model, the X boat was widened and a ramp placed in the bow. It was capable of carrying a jeep or light gun mount and troops which were unloaded when the boat beached and the ramp was lowered.

Other changes in the X boat produced the LCV, for carrying vehicles without troops; the LCP, for troops only; and the LCR, a rubber landing craft powered by an out-board motor.

Although the Navy froze the design of the 30-foot X boat, the Bureau of Ships really wanted a 40-foot craft. The following year a compromise was reached when Higgins persuaded the Navy to accept his 36-foot boat which was then in production for the British. This boat had no ramp and was powered with gasoline.

In all these small landing craft, a prime requisite is to be able to beach and retract, to run the boats ashore and get them off quickly when the cargo leaves. They must be strong enough to withstand the shock of hitting a coral, sand, or rocky beach at full speed without crumpling the bow; and they must be so constructed that the coxswain can reverse his engines and pull off the beach to bring in other loads of supplies or troops.

Getting the boats off the beach is made possible by placing a wooden tongue running down the middle of the boat's

bottom. The propeller fits into a slotted niche in the rear of this wooden bar. The bar keeps the craft from lying flat on the beach and always affords the propeller a bite into water without hitting sand. As long as the screw is in water, these boats will dig themselves out of seemingly impossible positions on the beach.

On the early models, the coxswain stood high in the stern of his craft as he steered toward shore, a perfect target for rifle fire. This has been changed, his position lowered, and protection provided. The early models of small assault boats also had a lever for reverse and forward gears plus a throttle lever. On a beaching operation, guiding the boat in and retracting in haste, the coxswain manipulating those levers looked like a shadowboxer. There has since been designed a simple lever combining forward, reverse, and throttle action.

The structure of these boats must also be strong enough to withstand their own dead weight of about 13,000 pounds, plus a full load, while being lowered from the side of a transport.

While the Navy was testing its personnel landing craft in 1936, it also undertook the development of "tank lighters." Plans for the first experimental lighter, which could carry one light Marine tank, beach in shallow water, and permit the tank to run ashore over a ramp, were completed in June, 1937. After testing, the Bureau of Ships began to build these 40-foot, gasoline-powered tank lighters, or LCM's. At the same time, Higgins was building a gas-powered, 45-foot lighter. In comparative tests of the two boats it was seen that Higgins' well-deck boat, although somewhat less dependable than the Bureau boat and considerably underpowered, was potentially very successful.

Reports of the tests stated that it needed only Diesel engines and more power.

There is the story of how Higgins, himself, was dissatisfied with this craft, and on the blueprints sent to Washington was scribbled in his handwriting, "This boat stinks."

When the engines were changed from gasoline to Diesel and 5 feet added to the length of the craft, in order to carry medium tanks, the Navy standardized this lighter as the LCM-3, in June, 1942. There's nothing pleasing about its lines. It's an awkward, high-ramped, deep-decked affair that looks like a baby LCT, but looks are of no importance when you're putting tanks ashore.

By late 1941, the importance that armored equipment, especially heavy tanks, would play in the war was apparent. It was evident that some provision must be made for carrying and beaching heavy tanks. The LCM-3 was suitable for medium tank traffic, from ship to shore, but a tank lighter would have to be built, larger than any previously conceived, which would be completely seaworthy and capable of Atlantic or Pacific crossings under its own power; for it would be impossible to launch a vessel of this type from a transport as was done with the smaller landing craft.

The same problem had occurred in England. The British had started landing-craft experiments in 1936. After the fall of France and the retreat from Dunkirk, a large-scale construction program for invasion craft began. The two major types of British landing craft being built were the LCM-1, similar to our LCM, and the LCA (Landing Craft Assault) which resembled our LCPR.

Early in 1940 the British Navy began work on an LCT (Landing Craft Tank). There was no previous model for

this ship. It went from idea to drafting board to shipyard. The first model, the LCT-1, was completed in November. It was 143 feet long, drew 7 feet of water aft, and carried a row of tanks in line. Currently, another model was being built, of approximately the same dimensions, only 2 feet wider to carry two rows of tanks. When this ship was completed it was found that two tanks could not be loaded side by side due to some pipes and fixtures along the sides of the well deck; so an LCT-3 was rushed to completion, widened and lengthened to 180 feet.

First tests were very successful. She was built in Newcastle-on-Tyne, floated to the west coast of Scotland through the Caledonian Canal and given trial beachings. She was then taken to Glasgow, Scotland, and loaded in sections aboard a transport bound for the Mediterranean.

Although the LCT-3 was a good ship, the Admiralty felt that her type was still not large enough to freeze design for the cross-Channel job. She simply could not carry in mass the material and troops necessary to follow through the shock of a continental invasion.

A proposal came from Prime Minister Winston Churchill for a ship of 7,000 to 8,000 tons, with forward ramp, shallow draft, capable of beaching and retracting.

At this suggestion the thoughts of someone in London's gray stone Admiralty building flew to South America, to Colombia and Lake Maracaibo. Oil was shipped across the lake and transferred to tankers which couldn't enter the lake's narrow outlet because of a blocking sand bar. Special ships had been built to take the oil out and across this bar—the old Maracaibo tankers. Why not use one of these? They were shallow draft. You could cut off the bow, put

in a ramp, scoop out the oil tank like a watermelon, put in a flat tank deck, and you'd have just what the Prime Minister ordered.

That is exactly what was done. Two old Maracaibo tankers were converted. That is how the LST began. The Admiralty decided to build 10 new ships like this. Since the Prime Minister had thought of the ship, its name would be the Winette. Contracts for the 10 Winettes were let, three in the British Isles and seven at Newport News, Virginia, with Gibbs & Cox as the design agents.

After the first Maracaibo tanker was scooped out and fitted with a ramp she was taken up to Scapa Flow for a test run. The skipper backed off and headed in toward the beach. Observers watched intently. A lot of invasion plans depended on this old tanker's action now. Her motors pumped and the screws churned up cold, gray water. Suddenly there was a lurch that threw the observers face flat on the deck. In the falling tide the little old tanker had struck a sand bar and stuck, with many feet of deep water between her bow and the shore.

Word was flashed immediately to the United States to halt construction on the seven Winettes until their design could be altered. There could be nothing more deadly in an invasion craft than to have it stick just offshore, a clay-ship target.

A few weeks later, in November, 1941, a small delegation left the British Admiralty in London to confer with shipbuilders in the Navy Department, Washington. At first the Bureau of Ships, already burdened with priority requests, were hesitant in agreeing to turn out a large landing craft. Then Admiral Vickery of the Maritime Commission, who

had been with the Bureau, produced a rough sketch design of an LST, a combination of his and the British ideas of what was needed. This design was studied and it appeared to be satisfactory.

On the basis of this, the British requested, under the terms of the then recently enacted Lend-Lease Act, that 200 such craft be built.

The new ship had to meet two design requirements: it had to be seaworthy, capable of crossing an ocean, hence a deep draft would be needed; it also had to permit unloading of tanks directly onto the beach, which meant that a shallow draft was also needed.

The solution of this double threat to the ship's designers was the use of a liquid loading plan. Giant water tanks would be built into the hull. With these tanks full of water, the ship would weigh down, lay low in the water with a draft deep enough to cross any ocean. Pumps would be installed. As the ship neared the beach, these would be manned. The water in the tanks would simply be pumped out, much like releasing the ballast in a submarine and, with the water out of these tanks, the draft of the bow would be next to nothing. She could drive it high and dry onto the beach.

During this conference with the British it was also decided that we should build LCT's, an intermediate landing craft, smaller than the LST and larger than the LCM, which could be carried into war theaters in sections on the decks of transports. The LCT could then be assembled, welded together, and could carry a limited number of tanks and equipment into shallow water and beach, affording the advantage of dispersal in a locality where LST's would be unloading.

This was in November, 1941, less than a month before Pearl Harbor. With this construction task before them, the officers in the design section of the Bureau of Ships began outlining the major characteristics of the LST and the LCT. They had to plan for speed, water displacement, cruising radius, armament, load-carrying capacity, structural strength, stability; and, for the ships going to the Royal Navy, provision had to be made for the inclusion of a spirits room, a wine locker. Before any ship is built, an accurate model is made for testing all these things.

The strange little models appeared and tests were rushed at the Navy's David Taylor Model Basin in Washington. They had to test propeller action under different sea conditions. All things listed on the paper in the design office had to be tested with the model ships. Everything had to be right now. There was no time to build a finished ship, test her, and then make corrections.

The LST was the tough baby. She utilized almost everything new to naval shipbuilding, while the LCT was comparatively easy to build. This craft was really an enlarged LCM. Its chief difference lay in the fact that it was to be built in sections for shipping and assembly. It was decided that these sections should be about equal in length, a stern, middle, and forward section, which would be welded together to make the complete craft.

When the model-basin tests were completed, design agents for both types were appointed: Gibbs and Cox, Inc., New York, were given the LST. The New York Shipbuilding Corporation in Camden, New Jersey, and the Manitowoc Shipbuilding Company in Manitowoc, Wisconsin, got the LCT.

At the same time contractors who were to work on the construction of these craft were called to Washington, shown the basic plans, and told about the tremendous assignment that was now in their lap.

Construction began in May, 1942. Hardly had the shipyards unfolded blueprints when there came an urgent dispatch from the British Admiralty outlining the needs for a larger type of infantry landing craft. Draftsmen, designers, and model makers began again, this time on an ocean-crossing landing craft for infantry that could carry up to 200 men and beach like the LST. One month after receiving the initial dispatch, the preliminary design of the LCIL (Landing Craft Infantry Large) was completed and construction contracts were placed. The New York Shipbuilding Corporation added this to their LCT program.

The next month, June, 1942, the Joint Chiefs of Staff called for the fleet of LST's and LCIL's to be ready and manned by February, 1943.

Faced with this dead line, the Bureau of Ships was forced to abandon all customary procedure of awarding government contracts. The Navy's basic shipbuilding program was already in full swing, utilizing all available normal facilities. The landing craft order was superimposed on all the rest. Preliminary orders and contracts were rushed to yards by telephone, telegraph, and brief air-mail letters.

Navy yards at New York, Philadelphia, Norfolk, and Charleston, all experienced builders of naval vessels, began to work. Yards of the Federal Shipbuilding and Drydock Company; yards of the Bethlehem-Hingham in Massachusetts; yards on the Gulf coast, on the west coast began working on the invasion fleet.

But these were not enough. New sources had to be found. The Navy turned to heavy industries along the inland waterways, to former bridge builders, men experienced in working with iron and steel, totally foreign to the intricacies of ship construction, but men willing to learn.

Little ship factories sprang up almost in the space of a day in motorboat sheds, in yacht basins, on property along rivers and inland streams.

Shops sprang up in Kansas, in Ohio, Illinois, Indiana, Texas, and Missouri, in Tennessee and Michigan. Thousands of people who had never seen ships or salt water were hired, quickly trained, and set to work. Some builders, having no yards, set up tents and assembled prefabricated parts under canvas.

Parts of invasion craft grew and assembled in half the states in the Union. In shops along the Mississippi, the Ohio, along the Great Lakes and down the Missouri River, men and women, farmers, mechanics, laborers, and skilled artisans were making invasion boats.

The Maritime Commission did its part by contracting and supervising construction of craft in some of its yards building merchant ships.

Problems arose as the work proceeded. The greatest of these was a growing materials shortage. Other war agencies had to be fed, bombers built, and tanks turned out. In some cases this materials shortage affected small parts, seemingly unimportant parts, but they held up the completion of a finished boat.

In the early summer of 1942, as a result of this, the Bureau of Ships organized a Materials Control Agency for the landing-craft program, with its headquarters in New York

City. This agency provided the most complete materials coordinating system ever achieved by a naval shipbuilding program.

At the request of the Bureau, without profit, the Bethlehem Steel Corporation provided a number of keymen for the agency. These men were given full authority by the Bureau of Ships. They immediately organized several hundred keymen to work with the Naval Inspection Service throughout the shipbuilding areas. Their sole job was to trace bottlenecks and break them, and to expedite the production of small parts.

The Materials Control Agency was so organized that the officers in the Bureau of Ships could know each week the exact status of every part of every vessel. The size of this coordinating effort is apparent when it is considered that the LST program alone involved over 1,700 purchase orders covering millions of unit pieces. With this system of checking, single bottlenecks down to the smallest subcontractor could be located and erased.

But even this, eventually, was not enough. It was found that, despite the efforts of the Materials Control Agency, certain parts were unobtainable because of previous priority commitments. With the cooperation of the War Production Board, the Navy was given the right to issue overriding priority orders for materials needed in landing craft.

It is worth mentioning that although the landing-craft construction totaled more than \$1,000,000,000 only three-quarters of 1 per cent of the purchase orders were procured by the use of this overriding priority right.

As the ships in the cornfield yards took shape, were completed and launched in the inland rivers, a landing-craft

ferry service was started to deliver them to the naval operating bases. For the delivery of ships 105 feet long and larger from these inland yards, supervision was vested in the District Coast Guard Office, St. Louis, Missouri. Here, old river pilots, wearing the Coast Guard uniform, guided the craft down the Mississippi River into the Gulf.

In November, 1941, the LST was a set of drawings on paper. In October, 1942, the first completed LST was given its trial run and acceptance test.

Four months after the LCIL was a design on paper, the first completed ship left the ways, October, 1942.

In both cases there had been no time to delay construction until the first ship had been tested. From design to delivery, these craft *had* to be right. The entire program was one in which no mistakes could be permitted. These boats had to be mass-produced like Ford cars. And they were. They were delivered on time and they worked. Chances were taken, from the designer, who took a risk that his calculations might be off, to the shipyards who said they'd produce on time. It was a victory equally shared, on a basis of mutual faith in accomplishment.

As the LST's started coming down the Mississippi River, a base was built in Florida to shake down the new ships and make them ready for service. Another base in Texas began to fill with LCIL's built in Houston and Orange.

The record day for Landing Craft Group was December 5, 1942, when 5,000 men and 590 officers reported for duty in the new craft. The sight of an LST was a surprise to many new men reporting. Even though they had seen the blueprints of the ship and had been told that this landing

ship for tanks was larger than a destroyer, their imagination still pictured something like the old invasion craft that swung down from a transport's rail.

But when they saw this ship, they knew that they were going to go places and do things.

Landing Craft Group

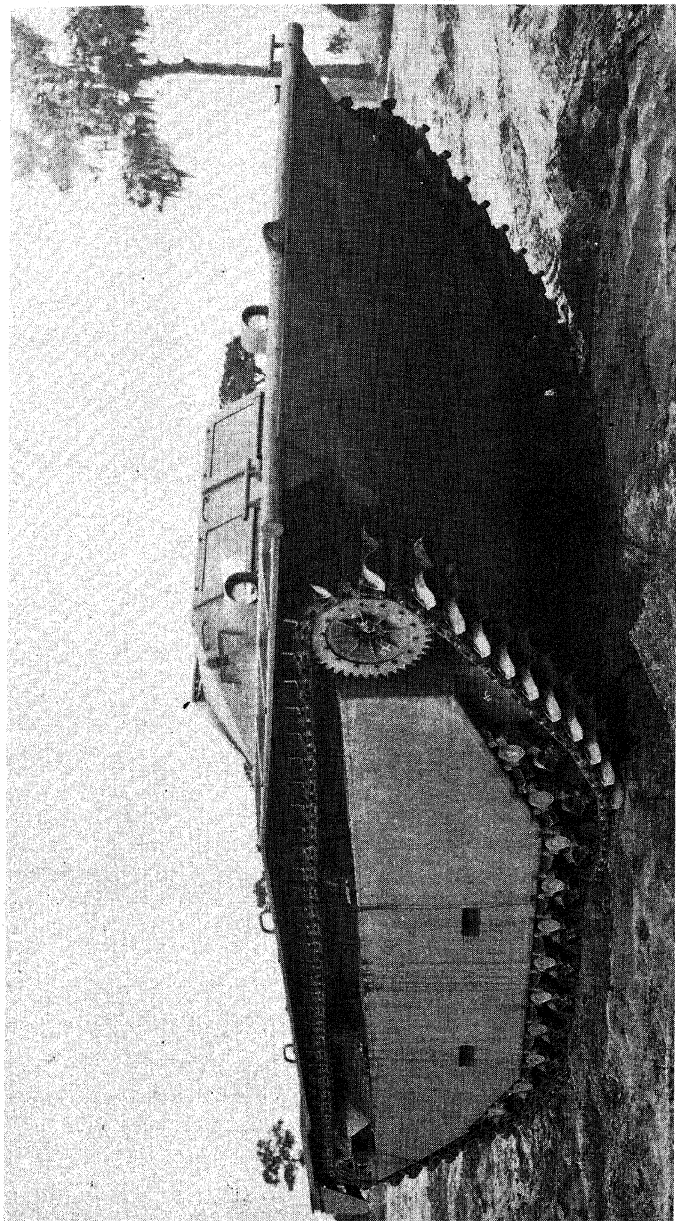
WITNESSING one of the Army-Navy landing exercises in the spring of 1942 was Lord Louis Mountbatten. As he stood on the beach and watched the incoming waves of troop-laden invasion craft manned by Army coxswains, he made the observation:

“Let the boys in blue do it. I believe a soldier would be happier if a sailor were running the boat that brought him ashore.”

Sometime, between the start of the Army engineers' program to train boat coxswains, and June, 1942, it was decided that manning landing craft should and would be a Navy prerogative. This decision meant a gigantic do-it-immediately order for the Navy.

The man selected to organize and carry out this order was Captain William Price Oliver Clarke, USN.

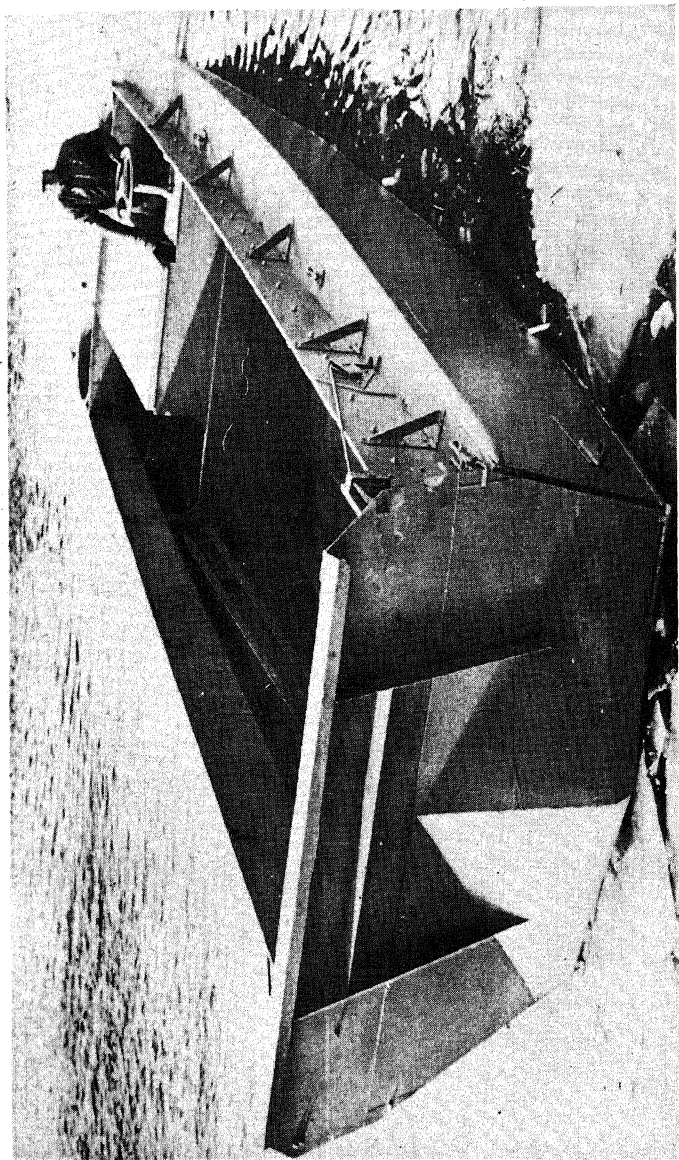
Captain Clarke is a large man. When he sits at his desk in the Nansemond Hotel all his surroundings seem small in comparison. As someone once remarked, he looks like Notre Dame's heaviest lineman in a telephone booth. His dark hair, lightened with gray, is usually out of place from finger combing. When he talks he smiles, a broad smile that hides



Official U. S. Navy Photograph

THE ALLIGATOR

LVT (Landing Vehicle-Tracked)



Official U. S. Navy Photograph

THE LCVP
(Landing Craft Vehicle-Personnel)

the troubles and problems that put him 6 months in the hospital after building the Landing Craft Group.

In January, 1942, Captain Clarke was the Executive Officer on the battleship *Washington*, a job whose importance is second only to that of the commanding officer. In February he was transferred to a transport, a former American Export Line ship that the Navy had purchased for use in amphibious training.

She was fitted out and taken down Chesapeake Bay. This trip was Captain Clarke's initiation into amphibious activities. It also showed how much was to be done in the way of securing trained boat personnel. From the ship's complement of sailors, he had to select boat crews, train them, and teach them their duties as landing craftsmen.

It was a hot day in mid-June when a message came over the ship's radio to Captain Clarke, asking that he visit Captain Emmet aboard the flagship of Commander Transports.

A more pleasant place would have been possible for breaking the news of a tough job. The flagship was an old transport, built for the Army in the last war, dirty and hot. She had just returned from India. The little popping crunches heard along the passageways as men passed were cockroaches, too indolent to move.

Captain Emmet's desk was covered with charts and papers filled with columns of figures.

"Here's a job for you." Captain Emmet handed Captain Clarke a sheet of paper.

Two phrases stuck out like braille when he glanced at it. ". . . secure, organize, and train crews for approximately 1,800 landing craft."

Below that was the other phrase. “. . . by February, 1943.”

Included in these 1,800 craft were LST's and LCIL's. No one had seen an LST at this time. None had been built, and no LCIL's had been built.

Crews for this program called for 22,000 men and 2,200 officers. This was without a training staff and its personnel. Add those and the total manpower needed for Captain Clarke's job would run something like 30,000 men and 3,000 officers.

“Where do we get the men?” asked Captain Clarke. “And how do we train men for ships that have never been seen? LST's and LCIL's are still paper plans.” Captain Clarke's hair was unusually ruffled.

“I don't know,” was Captain Emmet's answer. “But for this job we have the highest priority in the service. We work directly under COMMINCH (Admiral E. J. King), and we'll do business directly with Washington.”

With Captain Clarke at this time was Commander M. L. Lewis. Another officer was borrowed from Captain Emmet's staff, and the three men were given an office aboard the flagship with the services of one yeoman.

At a temperature that seldom varied, night or day, from 120 degrees, they began plans to train 33,000 men for ships no one had ever seen.

Captain Clarke recalled his first job on the USS *Washington*.

He had reported aboard in March, 1941, but the ship was not commissioned until May 15. During this time he wrote the complete Ship's Organization. A ship's organization, in simple terms, is a list of the rules of the house. It

divides the ship's company into divisions, provides for eating and sleeping, outlines duties in case of fire, collision, abandoning ship, and damage control. It is, in short, a list of the duties of every man for every possible ordinary contingency.

All this had been written *before* the *Washington* was commissioned. When she went into commission and the organization was put to test, it was 95 per cent accurate.

Why not do the same thing for the LST's and the LCIL's and let the men who were going to run the ships when they were finally built study these organization charts?

Captain Clarke took the blueprints of the LST and the LCIL and studied them. From these paper drawings he prepared ship's organizations for each type. This was the first textbook for crews assigned to the large landing craft. From this, they were to be trained in what their duties were to be, what the ship would be like, and how it would be expected to operate.

This was mid-June. An impossible date for training to begin was set: 2 weeks away, July 1. By starting on July 1, they would have approximately 11 training periods within the February dead line, allowing a training period of about 8 weeks for small-boat men and less time for those who were to man the larger ships. All this, provided, of course, that the ships could be delivered on time.

First plans were completed in detail within 48 hours. These plans provided for a pool of 1,000 men and 100 officers to enter small-boat training every 2 weeks. Personnel for the larger ships, the LST's and the LCIL's, would be handled as fast as the ships were delivered.

The staff which Captain Clarke formed to handle this

training assignment was called the Landing Craft Group, the third section of Admiral Hewitt's staff. The other two were Commander Transports and Commander Army Troops.

To make Captain Clarke's problem more knotty, the only training spaces available at this time were the transports themselves. To start the training, the group was assigned a total of six transports, four large and two small ones. On the large ships, a complete pool of trainees, 1,000 men and 100 officers, could be accommodated. The smaller ships were unable to house a group this large. This meant the pool had to be split, which complicated the training cycle.

Following the 48-hour planning period aboard the flagship, Captain Clarke decided to make a hurried trip to Washington. If he were to work this program directly from the Navy Department, it was a good idea to establish liaison officers immediately.

Armed with a letter of authority from Captain Emmet, he called on all the chiefs of bureaus in the Department. His plan of action was to contact keymen in each bureau with whom he could do business. When he left the ship, he instructed Commander Lewis to prepare the texts for instruction.

The trip to Washington was highly successful as far as contacting liaison officers. However, the visit to the Bureau of Personnel was disappointing. The Navy's personnel problem at this time, a little more than 6 months after Pearl Harbor, was acute. Enlistment was poor, falling about 120,000 a month behind what was needed. Trained men were being sent to fighting ships. The Fleet needs were draining all possible manpower sources.

On top of this came Captain Clarke's request for 30,000 men. It was staggering. He was promised men, but he was also told that he would receive no regular Navy men or officers. His trainees would be green "boots," men just out of indoctrination classes at naval training stations. The officers would be largely Naval Reserves, secured when and where they were available.

The Bureau of Personnel immediately began to call in men throughout the country who had had any boat experience whatever during the last war. These men were given the two stripes of a full lieutenant as prospective commanding officers of LST's. The Coast Guard was approached for men. Coast Guard men who were experienced in launching and beaching lifeboats in heavy surf would make excellent instructors for invasion craft. Orders went out to training stations for the first 1,000-man training pool.

Back aboard the flagship, Captain Clarke found that his staff of two commanders and a yeoman had done a remarkable job. The office was three-quarters filled with stacked mimeographed pamphlets, texts for the incoming trainees.

On July 6, only 5 days behind the "impossible" beginning date, the first 1,000 men reported. The 100 officers, which would complete this pool, would not arrive for another week. It was decided to split the draft, send part of the men up the bay for boat training, and select those with mechanical aptitude for a Diesel-engineering course.

This meant that an engineering school would have to be organized; and the group had no shore facilities. The Navy had established regular Diesel-engine schools, but there would be no graduates available for another 6 weeks. In order to keep the Landing Craft Group training schedule

from slipping behind time, the men would have to get their engine knowledge immediately.

A few days before the 1,000-man draft reported, a chief machinist aboard the flagship had said to Commander Lewis:

"I'd like to get mixed up in the preparation of a training course on Diesel engines."

The chief was a good man, and this was the right time for him to mix, if he could do it.

"All right," said Commander Lewis, "we've got to have an engineering school. Go into the base and see what you can get."

Ashore, Chief Clark began to look for a building in which to instruct Diesel-engine operators. After some inspection, he decided that a drill hall would be just the thing. He asked permission to use it. It was refused. This was Friday. Commander Lewis now forced Chief Clark really to mix.

"We've got to have a school for 300 men by Monday morning," he told the chief.

This time Clark went to Captain Horace C. Laird of the Landing Force Equipment Depot, which was next to Building 138. Somehow, as only chiefs seem able to do, he secured permission to use one of Captain Laird's shops.

On Monday morning, Clark organized his men into squads and marched them up to Captain Laird's shop. The captain took one look at this small invasion of his shop and changed his mind.

"I know you, Clark," he said, "and if I ever let you get organized in here, I'll never get you out. We have our own work to do."

The chief pondered this problem for a moment. Captain Clarke and Captain Emmet were up the bay on the flagship.

He had a school of 300 men standing at ease, no textbooks, no instructors, no school. He marched them back to their quarters and then went in search of more easily obtainable materials, like some plywood and chalk. That night he borrowed a paint gun from a shop and sprayed the plywood panel that he had borrowed from another shop.

The next morning, with his plywood "blackboard" still damp, he marched the 300 men off to the forbidden drill hall and began to lecture on the guts of a Diesel engine. The lectures began at 7 in the morning. The men were still there at 10 o'clock that night. Instruction had moved smoothly enough except for an almost constant ringing of the telephone with people wanting to know what in the hell was going on in the drill hall.

With all the rights of squatters on their side, Clark and his men were given belated permission to use the hall. During the first week, Clark found some equipment, a few books on the Gray Diesel engine, an old mimeograph machine, and a public address system. By this time, Commander O. H. Hill, who had been on the flagship, came into the school and to the assistance of the chief. He managed actually to get some Diesel engines to supplement the school lectures.

The first class completed its course in 2 weeks, on schedule. When this group moved up the training ladder, 50 of the best men were held as instructors for the incoming group. By now the original mimeographed pamphlet had grown to an 80-page compendium of information on the Diesel engine, largely through Chief Clark's remaining in the drill hall after 10 o'clock each night and writing the next day's lecture.

The school also begged from Captain Laird, and this time

got, eight landing craft. A strange repair course was begun in which men were sent offshore, told to think up every conceivable breakdown, see that it happened, then bring the craft in for the repair crew to work on.

These were the first of the green "boots" to come into Landing Craft Group for training. They were just out of indoctrination school; some had never received their full bag of clothing. They were the butchers, the bakers, and the light bulb makers of American youth. War was new to them, and organized Navy life was strange. In the pressure of the training they were undergoing, they had none of the usual shipboard administrative command. But they came hand to piston with a Diesel engine, and when they left they knew what made these engines tick, and when they didn't, the boys knew how to fix them.

As a new draft of men reported, those selected as seamen and coxswains would go up the bay to the transports. Those with mechanical ability were sent to the drill hall for 2 weeks. After their course in Diesel engines, they joined the crews on the transports. This was a continuous process until the Navy's regular Diesel schools were turning out a sufficient number of engineers to supply the Landing Craft Group's demand. When the first group finished training at the end of 8 weeks, the men were given their cap-and-gown graduation exercise on the beaches near Fort Story, Virginia.

The day was rough and the surf pounding. This would be a test of the efficacy of the past 8 weeks. The boat crews loaded in Hampton Roads and rounded the breakwater, heading down the coast to the Fort Story beach. They were a strange procession and a strange sight to the summer

cottage people familiar with white sails. The 50-foot craft were pounding the water; the roar of their engines and width of their wakes indicated their power.

Abreast of the landing beach, the line of boats halted, then came in to the shore in an arrowhead wave. Coxswains reversed engines; the boats pulled off the sand and went out again to form a wall of boats abreast. They roared into the sand in a perfect landing.

It was a "well done" they received from Captain Clarke that day. In the evening at one of the Navy base motion-picture theaters the men were given diplomas of graduation, each bearing an emblem which had been drawn by a seaman, inspired by the stories of the forthcoming tank landing ships. It was a tremendous alligator spewing tanks on a beach. This has since become the unofficial emblem of the force.

By now the force needed full-sized amphibious training bases. The Marines had gone to the west coast to form the Pacific Fleet Amphibious Force, leaving the Solomons Island, Maryland, area available.

This site had been previewed by Captain J. W. Whitfield, commander of a transport running up the bay on training cruises. It was his first trip up the bay. He was to meet the crews of landing craft sent up by the Landing Force Equipment Depot to take part in the training. When Captain Whitfield arrived and went ashore to see if the boat crews were ready for the next day's exercise, he found neither sleeping nor eating facilities for the men. He borrowed a car and drove out into the country to see the lawyer who had handled the lease details for the Marine Corps when they were training on Solomons Island.

Solomons Island had for years been a local game spot for Washington and Baltimore fishermen. It was a small, quiet fishing village with a boat yard and no winter activity. There was a village hotel, Rekars, that housed week-end parties and went empty the rest of the week. Captain Whitfield had his eye on this house when he went to see the lawyer.

The lawyer talked to the proprietor, who was pleased to get a long-term tenant in the form of the government, and a lease was signed. The boat crews had shelter. Food was another problem. Aboard the captain's transport were some field kitchens. He sent for these and some supplies.

Base construction work began shortly thereafter to hold three training units, about 4,500 men. From this beginning grew the present base that trains LST and LCIL crews for the entire Navy.

When the first 1,000-man pool reported to the Landing Craft Group for training, minus their officers, Captain Clarke was fortunate to find at the naval operating base a number of ensigns who had just graduated from the Naval Academy. These men were "waiting new construction"; that is, they were assigned to ships being built, and had no pressing duties until the ships were completed. The captain borrowed 30 of these officers for 2 months to assist in the small-boat training.

When the ensigns reported, they wanted to know more about this "amphibious business."

Captain Clarke explained and added, "I'll be glad to have you with me if you'd like to join the force."

There were no takers.

A few weeks later five requests came in from the men to

join the force. When these five men reported to him, Captain Clarke asked, "How about the others?"

"They decided against it," was the answer. "They said that they'd heard this outfit was an 83 percenter."

"Was what?" asked the captain.

"An 83 percenter. Eighty-three per cent casualties."

A dozen invasions have proved that it's more nearly a 3 percenter club, but this is an example of the original reaction and feeling toward duty with the Amphibious Force.

When the first group of officers arrived, a week after the 1,000-man pool reported, they could have passed for members of the local chess club. They had all served in the First World War.

One man in particular seemed to have outstanding qualifications. Although he hadn't seen the sea since 1918, he had studied eagerly every development in navigation. He knew all types of navigation and navigation aids. The first Sunday aboard ship Captain Clarke sent him ashore in charge of a swimming party. It was the first time he'd actually navigated a craft in 20 years. There was little navigation involved in getting from the ship to the shore, but he was in his glory, happy as a toy-starved child. That night he died of a heart attack.

Some of the men in this group of officers were over seventy years of age. They were the old Fleet Reserve coming back into a young man's war. At the time of their reporting they didn't realize how truly it was a "young man's war."

Captain Clarke talked to them, explained that the going was bound to be tough, the work strangely hard. He asked them if they were sure they wanted to go through with it. To a man, the answer was "Yes."

The captain smiled. These old sailors had pride, a pride you couldn't hurt by bluntness. He'd let them find out, quickly and easily. He sent them to a transport. In a few days they were back. A delegation of four knocked on his door. Their combined age was fully 250 years.

"You're right, sir," they said. "This is too much for men seventy-five years old. But we want to help. Perhaps there's something else we can do, some other job."

There were other jobs at which they, with their experience, would be invaluable. The majority of these men are still with the force.

Another day a different delegate knocked on the captain's door. The boys called him a "tuna fish," a friendly enough term, as far as terms go in the Navy, for Commander Gene Tunney's athletic instructors.

In the search for personnel, Commander Tunney had been asked if he could spare any men for assignment to the Amphibious Force. Twenty men volunteered for the transfer. Of these 20 men, one, Lieutenant Robert Halperin, was later to get two spot promotions and the Navy Cross, and another, evidently a perpetual volunteer, was the one who came knocking on the captain's door. His conversation began something like this:

"Sir, I didn't know what I was getting into when I came here."

"You volunteered, didn't you?"

"Yes, but I'm a special case."

"How?"

"I'm a married man."

"Yes?"

"Yes, I didn't get into the war to fight. I came in to do

this. . . ." Thereupon he began to illustrate his point with a series of calisthenic gestures.

Captain Clarke finishes this story by calmly saying, "He's no longer in the Navy."

By August, four pools of 1,000 men and 100 officers each had been trained. Then word began to seep through that the transports were going to be taken away from Landing Craft Group for use elsewhere. There was something in the air. No one knew quite what, but it looked like something big. Eleven new transports had been ordered, and now there was threat of losing the six old ones.

In the meantime plans had been made for another amphibious base. The old Whitehurst Farms had been bought.

This was beach and scrub-pine sand land about 4 miles down the bay from Ocean View on Little Creek. If the transports were taken from the Landing Craft Group, small-boat training could continue at Little Creek.

Loss of the transports was confirmed. A task force was being organized for an invasion and those ships were needed. In mid-September the group was notified in a landlordly fashion that it would have to vacate the ships. Training crews were removed and sent to the new base at Little Creek, and Commander A. L. Haas was assigned as first Commanding Officer.

There were no docks, only one small pier and no other facilities. There were no roads and no barracks. But there was plenty of mud—knee-deep, sticky, blue-clay mud. There were no mess halls or even kitchen equipment. A call to the Army brought promise of some field kitchens. When they came they were Civil War models, wood burners. The only place to put them was in a garage. Food was purchased on a

day-to-day basis. There were no storerooms. In the midst of this, men moved in, continued training, and left the mud for barracks as fast as four walls and a roof could go up.

Across Hampton Roads in the Portsmouth area, Captain Clarke had established a receiving station, a small Grand Central that funneled out new recruits to Solomons Island and Little Creek. This station was on the banks of Paradise Creek. It was commanded by Lieutenant Commander Martin B. Saportas, USNR, who began to refer to himself and his men as the Birds of Paradise.

With trainees scattered between Solomons Island, Little Creek, and Paradise, commuting became a problem. An old Wilmington gunboat type of Diesel-engine-driven freight lighter solved this problem. She was the *Lillian Anne*. The first day Captain Clarke saw her she was loaded with sugar for the Coca Cola Company. Captain Clarke chartered the ship with her civilian crew and started converting her into a ferry. With seats in her freight deck she carried 500 men with ease.

When the 11 new transports arrived, Landing Craft Group was called upon to supply the boat crews. Time was so urgent that it was also asked if the group could supply the beach parties for each ship. Formerly, these beach parties consisted of 27 men and 3 officers who supervised the unloading of supplies on the beach. A call went to the Bureau of Personnel. Orders were placed for the personnel needed in the beach parties. Barely sufficient men were available by drawing from a New York source. They arrived in 2 days. On the day of their arrival, the captain received word that each beach party must be increased from 27 to 43 men. At the same time he was ordered to set up a joint

communications school at Little Creek. More men. This was all in addition to supplying the transports with boat crews.

But the invasion convoy left with all demands met.

"It was never a question," said Captain Clarke, "of whether we could do the thing; it was a situation where the time to invade was right and we had to do it."

Men of the Landing Craft Group worked until they were ordered to take off one afternoon a week and every other Sunday. Most of the staff were reserve officers, or Academy graduates who had resigned their commissions at the end of the last war.

"Everything done was done by the excellent work of these men," said the captain. "It was done with sheer energy. No one had seen landing craft before, to say nothing of teaching others to operate them."

And to Captain Clarke came this citation:

The Commander in Chief, U. S. Atlantic Fleet, in the name of the President of the United States, awards the *LEGION OF MERIT* to

Captain William P. O. Clarke, U. S. Navy

CITATION

For exceptionally meritorious conduct in the performance of outstanding service as Commander Landing Craft Group of the Amphibious Force, United States Atlantic Fleet, during the period of preparation for major amphibious operations.

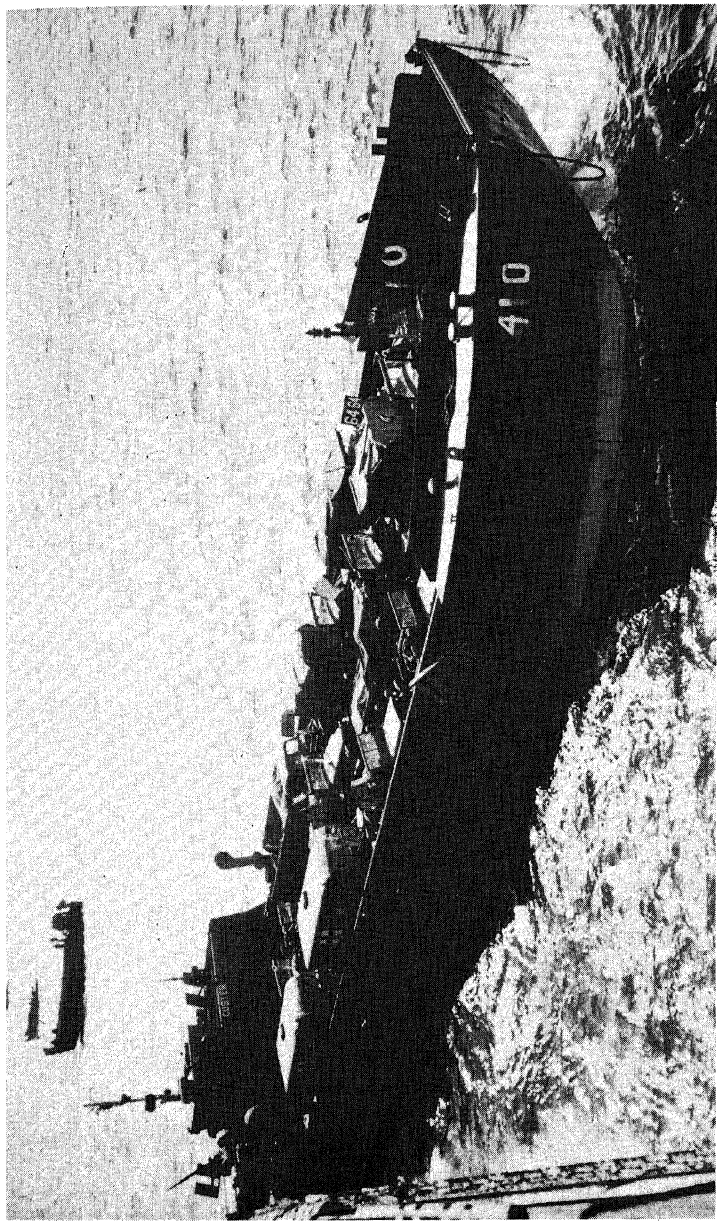
Commencing in the early part of 1942, Captain Clarke with extreme initiative and outstanding ability organized and established training facilities and carried out an extensive training program to provide efficient operating complements of officers and men

for all types of newly constructed landing ships and craft. His aggressive leadership and perseverance under many handicaps and trying conditions brought these ships and craft to a high state of readiness for combat operations and enabled them to participate effectively in all subsequent major amphibious operations in the Atlantic, Pacific and Mediterranean theatres.

The professional skill, resourcefulness and outstanding devotion to duty displayed by Captain Clarke reflect great credit upon the Naval Service.

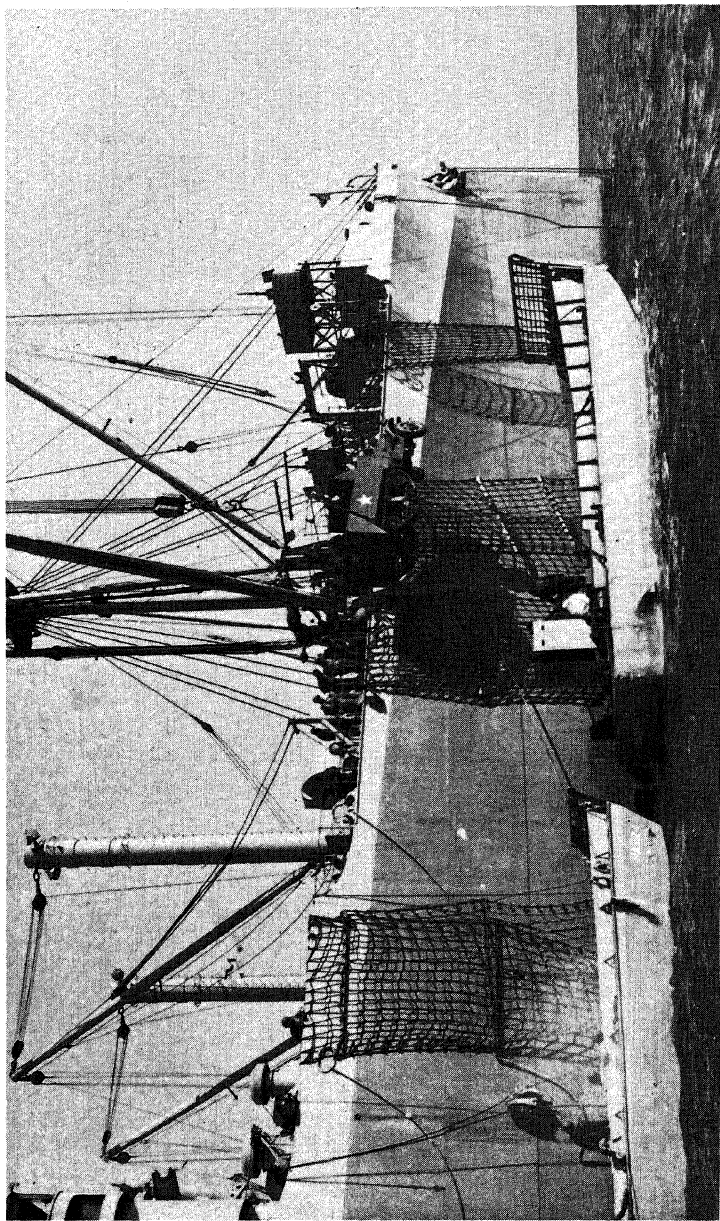
(s) R. E. Ingersoll

7 December 1943



Official U. S. Navy Photograph

AN LCT STARTS FOR THE BEACH



Official U. S. Navy Photograph

THE LCM GET A HALF-TRACK

Spit-kits and Tank Ships

THE first full-born LST slid off the ways in Newport News, Virginia, October, 1942, to wet her bottom in the water of Hampton Roads. She was to be the first of thousands of these strange new ships. These ships, 327 feet long, weighing 5,500 tons, with a crew of 7 officers and 75 men, are as big as a medium freighter.

The new LST was tied to a pier. The portable railing had been removed from one side of her upper deck. Demountable stanchions and ventilators were out, and in their place rested heavy cradles. A giant yard crane lowered its hooks and grabbed an LCT on the dock. Cables turned, and slowly this smaller craft, itself 100 feet long, came up and over the side to rest on the cradles.

One of the design requirements of the Landing Ship Tank was about to be tested, the launching from her decks of an LCT. The LST moved out to deeper water. Orders were given to man the starboard pumps. Very gradually, the LST began to settle to port. The pumping continued and the list increased. The launching crew, braced against the angle of the deck, took careful measurement. All seemed clear. The order was given to knock out the cradle chocks. Sledge hammers pounded. The LCT began to creak and

push against the restraining blocks. Then in one quick surge she was gone, over the side of the LST. Salt water dripped from the launching crew as they looked over the side of the tilted ship. The LCT was floating, right side up, ready to go in to shore. What had been asked for had been done. LCT's could be launched from the deck of an LST.

Next on the schedule of the new ship was a beaching demonstration. She was to be "combat loaded" for this. The loading of an LST for combat is an art in itself. The tank deck that extends behind those gaping bow jaws runs almost four-fifths the length of the ship. It's wide enough for a basketball court or a dance floor, and on the steel-plated deck are cleats that provide traction for tanks and trucks leaving in a hurry. Evenly spaced between the cleats are "butterflies," holes with protruding edges to grab the ropes that hold the vehicles steady in a pounding sea. Midway down the tank deck is a huge elevator, like those for the flight decks of aircraft carriers. This elevator allows double-deck storage. Tanks, trucks, and half-tracks can be carried up to the open deck above and lashed secure for passage. Directly behind those yawning bow doors on an overhead beam are red and green traffic lights just like the signals that control the intersections of any city streets.

In combat-loading any ship, the thing to keep in mind is, "Load last what must come off first." There can be no delay or disorganization when the ship hits the beach and the jaws open. Those things have to get out and get out fast.

The ship was made ready for the first demonstration of loading and unloading on a beach. On the night before the demonstration day she was loaded and the crews ready. Orders were to pick up the official party, British and Amer-

ican naval officers, the following morning at Little Creek.

Then occurred the first hitch in well-laid plans. The party arrived, but a 60-mile wind was blowing. It was impossible to get the LST through Little Creek channel.

Captain Clarke, who was in charge of the party, suggested they board the LST at the Portsmouth Navy Yard. Word was sent to the skipper to pick up the party there. The visitors borrowed a tug and crossed the choppy Roads to where the LST was waiting. Once aboard, the order was given to cast off, and the ship eased out.

She was hardly straightened out and under way when the wind struck her. The bow spun around and a shudder ran through the ship, reminding the British officers of the old Maracaibo tanker at Scapa Flow. The LST was on a sand bar. Signal lights flashed and two hemp-nosed tugs came pounding up to ease the big ship free.

"There was enough official gold aboard that morning," said Captain Clarke, "to fill a vault at Fort Knox. But the two officers in charge of the ship were old destroyer captains, good men, and I had confidence in them; so I didn't stick my nose out to find what the tenor of official conversation was at that moment."

Whatever it had been at the time of stalling, it had changed to full commendation by the time the LST reached the beach and disgorged her cargo. Amazed observers saw equipment for a small army pour out and spread over the sand.

Most of the official party left at this point, but Admiral Darling of the British Navy remained aboard to return to the Portsmouth Yard with Captain Clarke. The wind was still blowing in gusts of 45 to 60 miles an hour. The LST

was light and riding bow high. Once in the Roads, she couldn't make the pier at the Navy yard, and all requests for a tug to come out and lead her in were ignored. They were afraid to. The LST was whipping around like a leaf in a mountain rapids.

"We decided to anchor and spend the night," said Captain Clarke.

Orders were given to drop the hook and the ship ceased its wild gyrations, they thought. Admiral Darling stepped out of the chartroom and looked at the shore lights. They were whizzing past the bow—lights, the shapes of buildings, piers, and anchored ships, in a horribly mixed up picture. He waited for something to happen. The lights and dark shapes of buildings slowed, stopped; then the picture started whooping back again in reverse.

Admiral Darling turned to Captain Clarke.

"Did you think the same thing I was thinking?"

"Yes."

"I never believed the anchor would hold her. I congratulate you."

It was fortunate that the anchor had held. Almost directly behind them was a row of heavy piers which would have smashed the ship, to say nothing of a good deal of confidence.

INTO PACIFIC ACTION

Early in February, 1943, twelve LST's left a foggy east coast port, bows pointed south. From the crews aboard came excited questions of "Where are we bound?" and tense last looks at the shores of home. For many, this was their first voyage, their first job in the Navy after training school.

Both the LST's and the men were heading into battle for the first time. Their destination was the Solomons, 16,000 miles away, in the South Pacific.

For Lieutenant George F. Baker, one of the officers in this group, it meant going into his second major invasion of the Solomons in less than a year. Baker is what the Navy calls a "mustang." And it's a proud term to those who bear it. It means a former enlisted man who has been commissioned and wears the uniform of an officer.

Baker had 17 years in the Navy, and his father before him was a warrant officer. On his uniform, when he dresses up, are four banks of ribbons, including the Navy Cross and the Purple Heart. On his yellow Pacific Theater ribbon are seven bronze stars, every star a major naval action. He is a medium-sized man with thin, light-colored hair and some gold in his teeth.

Baker was going back to the South Pacific where he began the war on the heavy cruiser *Vincennes*, where he had helped General Doolittle's bombers take off for Tokyo, where he had fought in the battles of the Coral Sea and north at Midway. He was going back where the *Vincennes* had helped cover the Guadalcanal landing on August 7, 1942, and where, 48 hours later in that dark night off Savo Island, she had shot it out with the Japs and had gone down fighting. This had been Baker's Purple Heart battle. He was wounded from a shellburst. Headed back to the Pacific, he still carried six pieces of Jap steel in his body, pieces the doctors had decided not to probe for.

After he recovered from his wounds, the doctors recommended that Baker be "beached"—given a shore job. But, after 17 years in the Navy and loving it, Baker had other

ideas. He reported to the Amphibious Force and requested duty with the LST's. Not only was this granted, but he was given command of his own ship.

It was a long trip on the LST's to Guadalcanal, but they arrived in time for their assignment. The night the infantry spearhead stormed ashore at Munda, Baker and his LST's sailed from Guadalcanal, loaded with more men and heavy artillery for the Munda beaches.

When they left, Admiral Turner gave them a parting message.

"The eyes of the Amphibious Force are on you. You're the guinea pigs. It's up to you to prove these ships. Take 'em through and deliver the guns!"

The LST's got through and the guns were delivered. For a solid month after that the LST's shuttled between Munda and Guadalcanal. During those 30 days, Baker's ship was at anchor for 6 hours. On the trips to Munda the LST's were loaded with everything from chewing gum to 155-millimeter howitzers and high explosives. The return trips carried the wounded and the sick. A schedule of a round trip every 3 days was the average. And they weren't quiet trips. The Japs saw to that. The LST's fought, dodged, and escaped the enemy's bombers, his subs and surface vessels and fire from shore batteries.

There was not a ship in the entire flotilla which was not scarred by at least one hit. But they kept running. On the fifth trip to Munda, three LST's were entering what was called "torpedo junction," a stretch of deadly water in Blanche Channel.

A lookout on Baker's ship shouted. A school of torpedoes was streaking toward the ship. The order was given for full

right rudder and the ship swerved. The torpedoes missed, but struck the LST in the lead. She had a capacity load of 155-millimeter ammunition and land mines. She blew up like an arsenal.

When the smoke cleared and the fire died, there were shouts of amazement. The entire bow of the torpedoed LST was still intact, still floating. Two days later this hulk was towed into port and the ammunition that was still inside was unloaded.

A few days later an LST towed the bow all the way back to the repair base at Tulagi. Bit by bit the plates on the old bow were stripped and her parts taken to repair other damaged LST's.

"Yes," said Lieutenant Baker, "we proved those ships. They're good."

Somewhere in the Pacific is another LST, captained by Lieutenant Joseph M. Fabre, USNR, who was a research accountant in Baton Rouge, Louisiana, before the war. Leaving his wife and two sons for the Navy uniform, Lieutenant Fabre has totted up a lot of action in this war. He was on a transport that was torpedoed and sunk in the North African invasion. He came back to the Amphibious Force headquarters and began training for LST work.

It is his ship, somewhere out in the Pacific, that has a rim of color around her gray bridge, a row of seven little Jap flags, seven Jap planes shot down by the gunners on this LST. It was 2 days' work.

The first flag was earned one day in July, off Rendova Island. A Jap bomber was sighted. It was a long shot. It was not certain that the gun range would carry that far, but she made a beautiful target, silhouetted against the hot

blue sky. The gunners were given permission to have a try. They wheeled the black barrel around, gave the plane a little lead to allow for its speed in flight, and pulled the trigger bar. It was a perfect shot. The bomber fell in flames and the first Jap flag was painted on the bridge.

The other six flags were to appear after that hot August day when Allied troops landed on Vella Lavella Island. The attack was scheduled for dawn. Fabre's LST was approaching the island, H-hour 60 minutes away, when the "general quarters" alarm sounded. Men who had turned into their bunks fully clothed, expecting sleep but finding little, rolled out and up deck ladders to their battle stations. Every man in the gun crews was heading into a 24-hour shooting match with no relief and very little food.

Ahead, they could see the green shores of that island with the singsong name, Vella Lavella. Troops from the small craft had left their transports and landed as the LST neared the beach with her heavy cargo.

A small boat was lowered over the side. The ship's Executive Officer, Lieutenant James C. Respass, USNR, of Norfolk, Virginia, was going in to shore. With him, he carried a low-caliber machine gun. As he neared the beach he expected at any moment to hear the rattle of Jap bullets. But there was no opposition. Then it came, not from the jungle, but up in the air. Jap dive-bombers and fighters clustered for a run on the ships below, three LST's, some small boats, and five escort vessels.

Out of the sun they struck. Gunners on Fabre's LST were ready. They opened fire. One bomber flamed and fell, out of control. Whirling to sight on the bomber that had just straddled the LST's bow with two bombs, the guns

poured a stream of lead into the plane's fuselage. A third bomb fell directly ahead of the ship, spraying the fore-castle with shrapnel and wounding a medical corpsman. The plane pulled out of its dive, wavered, flew low over the boat carrying Lieutenant Respass ashore. He shouldered his light machine gun and held hard on the trigger as lead streamed into the belly of the Jap bomber. A thin column of smoke and water marked the end of the plane. Another flag for the bridge.

At the same time a Zero, flying low over the LST, lost its tail assembly to tracer bullets, and was completely destroyed by a near-by ship.

There was a short lull after this. The LST headed in for the beach, her bow doors open and her ramp ready to drop. The Gunnery Officer, Ensign Francis J. Dever of Dorchester, Massachusetts, made a hurried inspection of his guns. The ramp was lowered and two bulldozer tractors crawled ashore. One began pushing dirt and sand out to the LST's ramp, making a road for the other vehicles to drive out on. The other started biting a path into the jungle.

Slowly, the cargo and troops began to move out of the tank deck, onto the road, and into the jungle. Gunners were still at their posts, pushing down some hastily prepared sandwiches, when eight bombers escorted by Zeros shot out of the sun in attack formation. The bombers split into three groups, one for each LST. They met a blanket of withering fire and their bombs overshot the ships, striking the beach.

The bow gun on Fabre's LST pumped a full magazine

load into one bomber. Sliced almost in half, it exploded in mid-air and burned.

"Number three flag," someone shouted.

Seconds later a spotter, Boatswain's Mate Chester Larson of Aberdeen, Washington, shouted a warning.

"Zero on the starboard beam!"

Guns whirled again, and again tracers ripped into the plane like buckshot shattering an orange crate. Flag number four.

At 6:25 the next morning, the LST, with two more planes to its credit, pulled off the beach and headed back to its base. The gun crews left their posts, and a tired sailor went aft to the fantail to feed the ship's mascots, three baby chicks.

AT SICILY

Most of the Army troops who drive their trucks or tanks or jeeps down over the ramp of an LST onto an enemy beach will remember a man at Camp Bradford, Virginia, who showed them how to do it for the first time. He's Captain Bert M. Ruud of Montana. They will remember the captain because of the blue coveralls he wore to distinguish himself from the khaki-colored Army troops who were training on the beaches, and for the way he showed them how to back a jeep up the steep ramp of the LST. It's not an easy job to load vehicles up the ramp, especially in a high surf, and Captain Ruud knew all the tricks.

On his blue coveralls, Captain Ruud wears the triangular insignia of the Armored Force. Since he left his Montana ranch, he has been with the Cavalry, the Air Force, and the Armored Force. He was assigned to the Amphibious Force

as an instructor for the armored equipment units. He has a fondness for puns and likes to call himself an "amphibious tanker."

Captain Ruud has been with the force since June, 1942, when he went to Manitowoc, Wisconsin, with a detail of 12 men and 6 tanks to test the first LCT. After Manitowoc, he began training Army units in the art of loading and unloading an LST.

In April, 1943, a group of LST's left the east coast for North Africa. Aboard one of these ships was Captain Ruud on his way to an invasion to see just what should be taught after witnessing a real assault.

The LST's landed at a North African base and began days of intensive training, planning, and rehearsal. Crews were given a taste of what was to come by enemy air attacks every other day.

On July 9, the LST invasion fleet was ready to sail. This convoy of little ships carried a representative load of everything used by an invading force, but on Captain Ruud's ship the cargo was particularly peculiar.

"We wanted to see," he said, "just what an LST could do, just what she could carry."

The crew dubbed themselves the "guinea pigs" and painted a huge fat guinea pig on her hull. They loaded on airplanes, lashed tight to the port and starboard sides of the deck. Two long pontoon bridges were tied secure. There was a tank unit with men and tanks, there were radio equipment and antiaircraft guns for beach defense. There was a crew of Navy SeaBees to handle the pontoons which would be used for floating causeways when the ship neared the shore.

This was not too abnormal a load for any LST. But at the last moment came supercargo that made hands hold heads. Thirty tiny little African mules appeared on the dock, complete with food, hay, and grain. Orders were to load them aboard. The tank deck was full. The only place to put the mules was on the open deck above. Temporary mangers were constructed across the deck, hay and grain stacked behind, and the word was passed that the ship was ready for the mules.

But the mules were not ready for the ship. Their eyes bugged out like plums on stems when they saw the ramp they were expected to walk up. No amount of halter pulling would convince them that it was a safe or pleasant place to go. Although small, they were too large to pull on by brute strength. Then Captain Ruud's Montana horse memories came to life.

"Back 'em on," he said.

And they were backed aboard ship with only slight reluctance.

That day the LST fleet sailed. These were the ships we had seen as our task force passed Bizerte.

The sky turned hazy and the seas began to chop. The wind increased until, by late afternoon, it was blowing a 45-knot gale. The LST was giving its peculiar short, sharp list.

"She was rolling so you could lean over and pat the ocean right on the back," said Captain Ruud.

The only happy life aboard was contained in the 30 little mules. The wind had soaked their hay with salt water. Word was passed to come up on deck and watch the mules. They were having a wonderful time. They just stood there, feet

braced against the roll of the ship, eating salt-covered hay as if they'd never see another bite of food and shaking their long ears with pleasure.

The most troublesome part of the ship's cargo, it turned out, was the thing that did most for seasick morale. Men forgot about themselves just watching the mules on their first sea voyage.

The invasion began at 3:45 A.M. By daylight the beaches had been marked for the LST landings. The tank ships came in and began to unload. Bombs were falling from low-flying German planes that would streak in from behind a ridge of low hills, release their load, and disappear. Anti-aircraft shrapnel splashed the water and painted great puffy mushrooms in the blue sky.

Tanks and wheeled vehicles were all ashore. By 11 o'clock the last mule had been lowered down the deck elevator, backed down the ramp, and loaded with equipment to take inland. Wounded and prisoners began to come aboard.

From that time on, Captain Ruud's LST ran a shuttle ferry service from Sicily to North Africa. On the second trip to Sicily, the cargo was 300 horses and 300 native Goums!

"We suggested after that," said Captain Ruud, "instead of being called Landing Ship Tank, it should be LSW, Landing Ship Warehouse."

About the same time the LST's were making their first ocean crossing, the LCIL's were shaking down, making ready to hit high waves. These craft, which the enemy saw for the first time nose high on Sicilian sands, are about 155 feet long, capable of carrying around 200 infantrymen on

short trips, although there are neither quarters nor bunk space for carrying this many on a transocean voyage.

The LCIL has an unorthodox appearance, too. Her superstructure is stubby. From a distance she resembles a surfaced submarine. On the two sides of her bow are little terraces from which shoot the landing ramps for unloading troops. Her galley is tiny, cabins for officers are small and compact, her wardroom resembles a café booth. Your first impression of an LCIL is that everything is in miniature, from engine room to wheelhouse. But she's a sturdy little ship with a crew of three officers, the commanding officer usually being a lieutenant, junior grade, with two ensigns, and a crew of 21 men.

This is the craft the men have labeled a "spit-kit."

The first flotilla of LCIL's to cross the Atlantic to the Mediterranean was commanded by Captain L. S. S. Sabin, Jr. His memories of this crossing are vivid and at times painful.

"Did you ever hear about sailors with all the courage in the world, but no guts? If you haven't you will now, because most of my sailors lost all their guts 24 hours after sailing. We went to sea, the lawyers, the bankers, the garage mechanics, the salesmen, and me, in our little spit-kits.

"The flotilla struck rain, fog, sleet, and snow. The days passed. Some were sunny, but most of them were stormy. The little ships kept moving, bounding and bucking and twisting. The majority of the men were seasick, too sick to leave their bunks except when thrown out by the lurch of the ship. There was not refrigerating space to hold fresh food for a long voyage, so they ate canned food. But it made little difference.

"Most of the old salts who didn't get seasick had to face food mixed with the smell of oil fumes and the stench of men too weak to clean up after themselves.

"At night you darkened ship so the subs wouldn't get you. Then you expected a pot shot from one of the big ships because you looked like a sub. You watched for collisions. The water was cold and deep out there.

"The lookout shouts. Full left rudder. Hang on, boys. Clutch the grab rail with one hand, hold your glasses with the other, wrap your leg around the compass stand, and peer into the darkness. And pray. Another spit-kit. He missed us this time.

"Well, there's always breakfast in the morning. That is, if you cook it yourself. Cook's sick.

"Got a star sight this morning. Turned the sextant upside down and watched the twinkle jump from sky to horizon. You can't take a sight that way? Who says so? You're standing on your head most of the time anyway.

"You watch the kids who are manning these things, officers and men. Almost all are reserves. A year ago they were accountants and advertising men, grocery clerks, soda jerks, and garage mechanics. Not so now. They're sailors. They stink with it, those who can still move to their stations with a bucket. A lookout peers, turns his head to feed the fish, and peers again. The signalman pukes in his bucket in steady rhythm with the flashing of a message.

"They haven't got any guts left, these kids. They've spilled 'em all, but they've got what it takes. They're game guys, big men in little ships; American youth learning the hardest way of all, on the high seas in a spit-kit going through a war zone. They take it in their stride and some-

how, God only knows how, they manage to smile. That's why we'll win this war. You can't beat stuff like that."

It was just such a crew as this, men who had spit-kitted across the Atlantic to a North African base in time for the invasion of Sicily, that received the first Presidential Unit Citation ever given to a landing craft.

It was the LCIL-1, the first LCIL built on the number one government contract let for this type of boat.

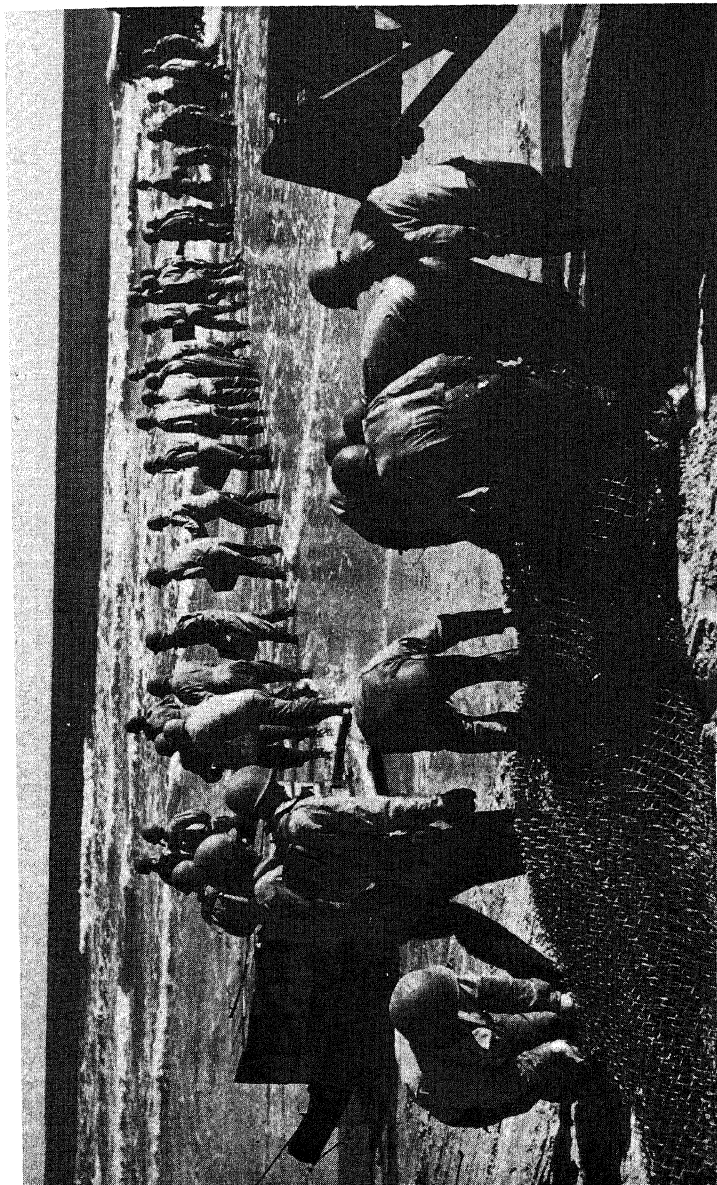
Her captain was Lieutenant Carl F. Robinson, who came from a little town near Ithaca, New York. He had had no sea experience prior to joining the Navy in 1942. He was a short, black-haired man, whose width of shoulders gave him a stubby, packed-down appearance.

The ship had been built in New Jersey, the first LCIL to be built and the second to be commissioned.

Early in the morning of July 10, she headed in for the beaches of Sicily, loaded with infantry troops in the first assault on a section of the island called Licata.

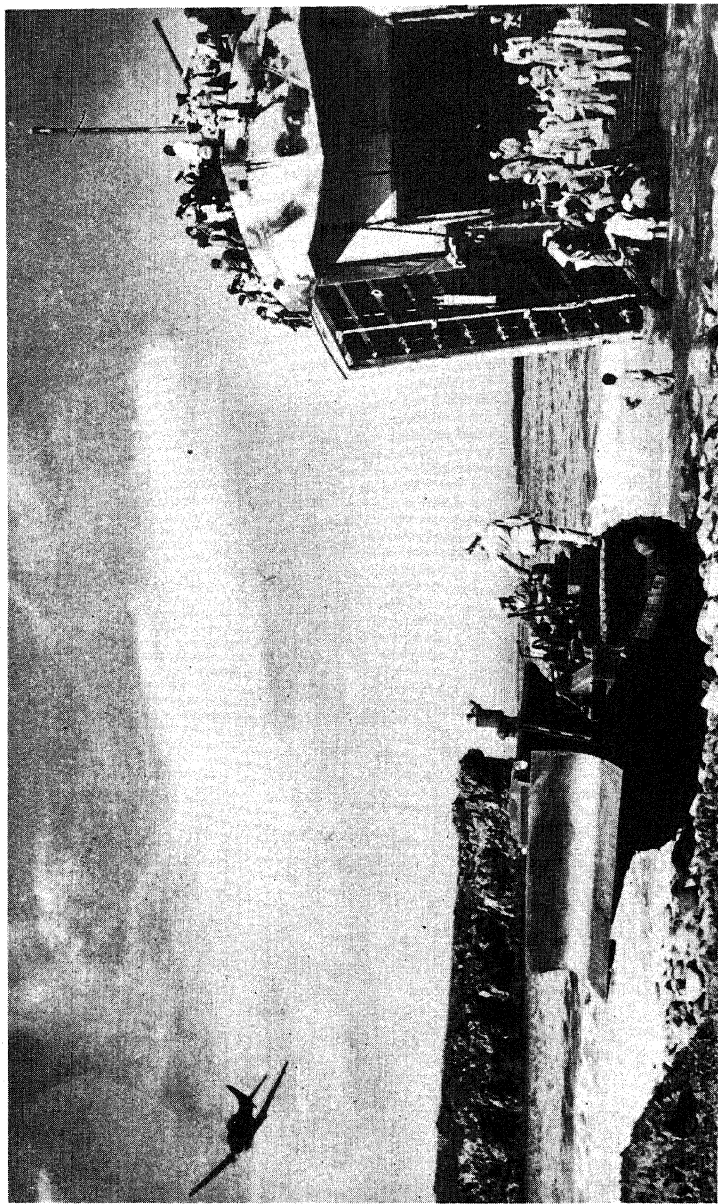
A short distance from the beach, a hail of enemy fire splattered against her plates. A bullet struck the sailor at the speed controls. He fell forward, pushing the engine-room telegraph control lever and jamming it to the position marked "full speed ahead." Below, in the engine room, this unconscious signal was obeyed and the craft shot ahead.

At the same time, the helmsman was wounded. He dropped, unconscious, leaving the wheel unmanned. In the same barrage, the winchman on the stern of the boat, whose assignment was to drop the anchor when the ship neared the beach so that she could pull herself off again, was shot before he had time to release the anchor.



Official U. S. Navy Photograph

THE SUPPLIES COME ASHORE



Official U. S. Navy Photograph

TRAINING WITH THE BULLDOZER

At full speed, with no guidance, and with no anchor drag, the LCIL ran up on the beach, swung broadside and grounded. The troops unloaded safely, but for 4 days this craft lay helpless on the sand, her gun crews firing at relentless air attacks and returning shore machine-gun fire while the damage control crew worked to repair the ship and get her off the beach.

The craft had long since emptied its larder of fresh meat. During one of the lulls, three men went ashore to forage. They returned with ten chickens in a gunny sack.

"They looked good," said the captain, "but they turned out to be the toughest damn chickens we'd ever seen."

The cook fried them first. Knives bounced off the pieces of brown meat as if they were made of rubber. Then the meat was boiled. It was still too tough to eat. The cook gathered up the pieces again and with a cleaver cut the meat into a kettleful of tiny dices. Three days after cooking began, the crew had chicken à la king.

At the end of the fourth day, LCIL-1 was a well ship, repaired and floating again. She backed off the beach and returned to active duty.

The Presidential Unit Citation is awarded by the Secretary of the Navy, acting in the name of the President, to naval or marine units which "perform services above and beyond the high standard expected of our forces."

This is the text of the citation accompanying the award to LCIL-1:

For outstanding performance as a unit in a Task Force during the initial landings on Sicily in July, 1943. Moving in under a fierce barrage of hostile fire,

the USS LCIL-1 suffered vital casualties which ruptured her communications and seriously wounded her helmsman and lay on the beach, raked by hostile artillery and machine-gun fire but still fighting gallantly and silencing several enemy guns ashore despite her helpless position. Repeatedly attacked from the air, her officers and crew remained steadfastly with their ship throughout the 4-day period until she was again afloat and salvaged for further active duty.

Another LCIL, during the invasion of Sicily, received an award, unofficial and perhaps the strangest citation ever given a landing craft. There is no ribbon to wear to show for its receipt, but because of the circumstances and the warmth of the giving it is treasured by officers and crew.

This LCIL began unloading troops about 9 o'clock on invasion morning. Soldiers pounded down the ramps in record time. The ramps were pulled up and the little craft started to wind up her anchor and pull off the beach. Then out of the sun came a German bomber. The crew saw its bombs fall, miss, and land 75 yards away. The ship was off the beach and under way a few moments later.

Only then did one of the officers take time to go below to the wardroom. On the table he found a note, left by the departing troops. He opened it and read:

To officers and crew:

*Remembrance for a very enjoyable
voyage.*

Best of luck,

The Army.

Attached to the note was \$25. The money was turned in to the crew's welfare and recreation fund.

In the South Pacific, about 30 miles off Bougainville's Empress Augusta Bay, a group of LCIL's, escorted by a PT boat, were slogging along under a late sunset, when out of the scarlet clouds came a squadron of planes with the red ball of Japan on their wings. The lead plane roared in low, low enough to take the radio aerial off the PT with one wing tip. Guns blazed and the Jap plane made a crazy wake in the water as it skimmed the surface and then sank. The 20-millimeter guns on the LCIL's opened up at the covey of Nip planes that followed. The first burst sent the second plane roaring into the water. Two more followed.

Trigger-conscious thoughts failed to realize these planes were dropping torpedoes. Then a lookout sighted them, at least half a dozen steel dolphins leaping the waves, headed for the tiny ships. Some were launched too close to the water to arm themselves and exploded like bombs when they struck the waves. One leaped completely over the stern of the PT. Another struck the PT just above the water line, passing cleanly through her bow and out the other side without exploding.

Another torpedo ripped into the plates of the LCIL. The little craft shuddered, listed, then righted herself. There was only one hole. The torpedo was still inside.

The Gunnery Officer, Lieutenant Pete Kirille, who used to play professional football for the New York Yankees, went below to investigate. There was the sleek, hard form of the torpedo, resting securely against twisted metal, the war head still unexploded.

Signals were flashed for the PT to stand by to take off the men of the LCIL. They were going to abandon ship. At any moment the war head on that torpedo below might go off, blowing the craft cloud high.

The PT came alongside. Men clambered over the rail and stepped down on the wooden deck of the rocking torpedo boat.

Then Lieutenant Kirille stopped. "I want five volunteers," he said. "I think we can save the ship if we can get that war head off."

Five men volunteered and following Lieutenant Kirille, climbed back aboard the LCIL and disappeared below.

The next day she limped into port to get a patch on her wounded side.

These are some of the big men in some of this war's little ships.

It Doesn't Grow on Trees

IT DOESN'T grow on trees."

That's the prime commandment given to officers and men working under Captain Horace C. Laird of the Naval Landing Force Equipment Depot.

"If you don't have it, then make it!"

That's the first lesson taught to men coming to work in the depot or those leaving to set up landing-craft repair units overseas.

After the Amphibious Force was organized and the small landing craft, the assault boats, began to stream in from shipyards and shops, it was apparent that a unit of some kind would have to repair the boats that would be bent and broken by sailors learning how to use them. Foresight also dictated a place where boats damaged in an invasion could be sent for salvage and reconditioning. Men would also have to be trained to make emergency repairs in war zones.

The force turned to a unit already formed and functioning along these lines, the Naval Landing Force Equipment Depot. In the Building 138 days of the force, the equipment depot was two buildings away, a machine shop and a carpenter shop. Here was a storeroom and an engine room and a second-floor landing where the men slept.

When the Landing Craft Group, under Captain Clarke, began to train coxswains, it called upon Captain Laird's depot for instructors. New men were given their first small-craft seamanship lessons in the depot's boats in the Navy-yard basin, and the Coast Guard men who came in as instructors took them around the basin to a long finger of sand, called Willoughby Spit. Here, the sailors were taught how to ram their boats up on the beach and get them off again. Damaged boats were sent in to the depot for repair.

The depot at that time was a group of 8 officers and 271 enlisted men. The story of its growth to a current staff of 70 officers, 1,117 enlisted men, plus a continual pool of over 1,800 trainees, with 128 acres of land and a Ford Motor Company assembly plant, is a story of incredible achievement, efficiency, and savings.

It's largely the story of one man, towering, white-haired Captain Horace C. Laird, a Naval Academy graduate who retired from the Navy at the end of the last war and turned his interests toward building pleasure craft and racing yachts in Norfolk, Virginia.

Captain Laird is a long-range planner who considers it good business to know what you're going to need tomorrow, from the number of cans of gray paint needed to touch up damaged craft, to the kind of tool kit needed to patch a boat's belly ripped by the coral of a South Pacific base.

It was such planning that enabled him to secure a factory site for his shops in March, 1943. Need for more than his original two-building space was apparent by June of 1942, for now the depot was maintaining a pool of 397 new boats, equipped and ready for issue on a few hours' notice. In addition to these new boats he had 34 various types of other

craft under repair. And his personnel had increased to 738. There was a pool of trained operators to go with the boats when they were issued. There was a stock of equipment and spare parts on hand whose value exceeded \$1,500,000.

The little depot was going into business in a big way, and it needed more room. A few miles away, in South Norfolk in a little residential section called Berkley, there was a Ford Motor Company assembly plant. It was idle. New cars had long since given way to war production. Captain Laird investigated and in short order negotiations were under way between the government and the Ford Company to purchase the plant.

The contract had hardly been signed before Captain Laird began a deft, but persistent, infiltration movement. As soon as one section of the plant had removed Ford equipment, Landing Force material was moved in and set up.

In October came the order to equip the convoy of invasion transports. This depleted the stock of 397 assault boats on hand, but, to indicate how rapidly these craft were being built, by the day of invasion, November 8, the depot had on hand 652.

The order to supply the transports with assault boats was easy. They had been held ready for that purpose. But the next order was an unexpected one. The convoy was poised for sailing. An urgent message was sent to the depot, saying that it was absolutely imperative that the transports be supplied with 400 units of a certain type of gun mount. In the last-minute rush, this detail had slipped by the check-off list. They couldn't be found anywhere. Could the Landing Force Equipment Depot do anything about it?

It could and did. Captain Laird called in his engineers

and told them the story. There was not a single unit of these gun mounts on hand to copy from. Could they design one and start building them? The engineers went to work. In a day and a half, 400 gun mounts were designed, built, and delivered to the ships. And they were better than the ones previously used.

"They're now standard equipment," says Captain Laird, a bit acidly, "called Army mounts."

This was not the first, nor was it to be the last, time that Captain Laird heard, "We can't get it anywhere else. Can you make it for us?"

In July had come a large order for a certain small-boat part needed by the Marine Corps. Captain Laird had heard nothing about such an order prior to this, so he called Washington.

"The Marine Corps is supposed to be supplying that one," was the answer.

He called the Marine Corps.

"No, Washington was to deliver the order, but their contract is divided, one half the parts to be delivered in September and one half in October," they said.

"We can't wait. We need them now. Can you do it?"

In a day and a half the machine shop at the depot made 3,000 of these parts and in 2 days they were delivered.

It was work like this on invasion craft that won for Captain Laird the Navy's Legion of Merit award with the citation:

For exceptionally meritorious conduct in the performance of outstanding services as Commanding Officer, Naval Landing Force Equipment Depot, Norfolk, Virginia, prior to the landings in French

Morocco on 8 November 1942. Captain Laird, while serving under the command of Commander Amphibious Force, United States Atlantic Fleet, expertly organized, equipped, and operated with great efficiency repair facilities for the overhaul, maintenance, and refitting of ship-borne landing craft. He was responsible in great measure for the high state of material readiness of the landing craft assigned to the ships of the assault convoy both during the long months of training and preparation, as well as the actual participation in the assault operations.

The extraordinary ability, initiative, and outstanding devotion to duty displayed by Captain Laird reflect great credit upon the Naval Service.

"When we started this job," says Captain Laird, "we burned all the red tape. We've requisitioned no more, and if I catch anybody with it . . ." Here his voice trails away, with the menacing threat unsaid.

From the outside, the old assembly plant housing the equipment depot's shops looks like any modern, well-kept factory. The roof is serrated to allow sunshine inside. The front is faced with clipped lawn and hedges. It's only after looking through the high, stiff Cyclone fencing that surrounds the 128 acres that you realize this is something pretty special.

On cradles, row after row, separated by well-kept, graded roads, sit gray, waiting invasion boats. You don't count them because the total number would be secret anyway, but your impression is that here sit literally hundreds of boats, waiting . . . On their sterns is a list of dates, each 2 weeks apart, marking the last time the engines were tested and turned over.

The man who is continually amazed at this sight, the view of his own work, is Commander George Burl Llewellyn, the Executive Officer of the depot. Commander Llewellyn is another "mustang," but, unlike most, he wears the scrambled eggs of a full commander on his cap brim. Last August 7 he celebrated his forty-second year in the Navy. He is one of the "old men" who came back and stayed to do a good job. He entered the Navy on August 7, 1901, with a rating few people now have heard, "landsman for sea training." He got this landsman for sea training aboard the USS *Lancaster*, a full-rigged sail and steam vessel.

Commander Llewellyn is short, stocky, and his gray hair accents small blue eyes puckered tight in a way befitting a man who has sailed on a full-rigged ship.

"If you could only have seen this last year," he says, pointing to the graded yards holding the racked boats, "if you could only have seen it then. Nothing but swamp water and mud. They called it Llewellyn Lake. But we filled it in and drained it, and now look at it!" And he rides away on his bicycle. It's a heavy, red bicycle. Even the lard-pail-sized claxon horn clamped on the handle bars is painted red. He rides this bicycle around the yard wherever he goes.

Another source of pride to Commander Llewellyn are the railroad lines running through the yard.

"We built 'em all ourselves," he says.

But that's only part of the story. How stock for this little rail system was acquired would make a "Saturday-sale" shopper blush with inadequacy. It was necessary, in the first place, to have hauling vehicles of some kind to transport the boats from the water up to the parking area. The most feasible would seem to be cranes to lift them out and place

them on dollies, and dollies to run along rail tracks, pulled by an engine, to the point of unloading.

Many things most feasible are not the easiest obtained, however. A traveling crane was borrowed from the Navy yard. But this was unsatisfactory and impermanent. The Navy yard insisted on getting it back. Finally, cranes were purchased and the men of the depot assembled them, sinking some in permanent concrete blocks where they knew they would always be used.

Then from the Norfolk and Western Railroad Company Captain Laird bought some old rails, 3 miles of them, rails that had been discarded by the railway company and sold as junk. These rails were hauled to the depot's land and laid out. From another dealer in heavy junk, old railway wheels were bought and carried in. Springs and cradles were built on these wheels to form the dollies.

The system was ready to operate now, except for the lack of an engine to haul the dollies. The answer to this need was the "Yard Bird."

Yard Bird began his career in France during the last war. He was built for the narrow-gauge French railways, looking as much like a toy locomotive as the LCIL does a miniature ship. Somehow Yard Bird had found his way from France to another junk dealer near Norfolk. This is where Captain Laird found him the day he was looking for wheels. He bought Yard Bird for \$300 and trucked him back to the depot. Although the motor hadn't been turned over in 18 years, Yard Bird is now polished and shining, and chugs along the yard rails with a mighty load.

With the yard dispersal system working, boats could be handled at a faster clip. They came in by rail and by ship,

from training bases, from North Africa, from Iceland. You don't realize the size of any ship until you see it in dry dock. This is especially true of invasion boats. We call them small craft, but when you see the part that's usually hidden beneath the water, they look pretty big. When they come back for repairs they look like wounded soldiers coming home for treatment. They look out of place on railroad flatcars, naked and embarrassed without water, their bottoms pounded and dented, with gashes in their sides and bullet-splintered scars.

Over 10,000 invasion boats had crossed this yard and the other parking area west of the assembly plant by October, 1943.

"That yard was another fill-in job," says Commander Llewellyn. "See that road?" He pointed to a graded road running between more rows of boats. "They called that 'Dream Highway.'"

The name stuck. It's still called "Dream Highway" by the men of the depot. It started when the depot first moved in and there was nothing but salt marsh and water. Commander Llewellyn had said one day, "We'll fill that in and build a road across here," pointing to nothing but deep water. Some of the men thought he was having an idle dream.

Both Captain Laird and Commander Llewellyn are proud of the fact that they've never turned down a job.

After the invasion of North Africa, eight damaged landing craft were returned to Charleston, South Carolina. The men there took one look at the boats and sent the depot a letter requesting permission to sell them for scrap. They had been offered \$500 apiece, and, for boats not considered

worth salvaging, this was thought to be a good price, even though construction cost runs about \$8,000 apiece.

Captain Laird sent a negative to this request, saying, "Let the depot see them first."

All eight of those boats are now repaired and back in running condition.

Another example of poor salvage judgment, caught in time by the depot, occurred when four LCT's and 82 engines were considered worthless by another yard and sold to a junk dealer for \$2,800. This sale was rescinded by the depot when it learned of the deal. The company was refunded its \$2,800 and the boats and engines were recalled. The damaged LCT's and engines were shipped to the depot. All of this equipment has been rebuilt and either sent out to sea or to schools for demonstration items. On this salvage job the government was saved an estimated \$320,000; over \$88,000 on engines alone.

When a landing craft comes in for reconditioning, depending upon its need, it goes either to the hull repair shop, or if the engine is bad, it is stripped and sent to the engine repair shop.

The hull repair shop, under the direction of Lieutenant Commander H. P. Cummings, began with a team of nine carpenters, three shipfitters, and two painters. It now occupies one end of the huge assembly plant, has over 800 men working in a carpenter shop, a pattern shop, a shipfitter's shop, a sheet-metal shop, a foundry, and a plumber and welding shop. This unit of the depot has never found a hull too badly smashed to repair.

The hull repair shop is a strange mixture of smells, of hot metal and planed wood, of brass drippings and sawdust.

On one cradle is a boat with her entire side bashed in, bottom gone, and bow ramp twisted loose. The men have been working on her. New ribs are going down the sides. New plywood has been formed over the open scars. Measurements have been taken for a new mahogany bottom. In a few days she'll be a well and watertight ship.

In another cradle lies an old LCV. They're tearing off the old bow, putting in a new ramp, patching up holes. She'll never see combat action, but she'll train coxswains who will.

Near by is the propeller shop. A propeller or its parts are never thrown away no matter how badly bent or broken. Here, welders build up chipped blades, curve them, balance them. They can turn out 20 to 30 boat-ready propellers a day here, and by using bronze scrap to build up broken blades they save more than \$500 a week in what would be spent for new metal.

As these figures would indicate, a working motto for the Landing Force Equipment Depot is: "Save the government money."

Again, Captain Laird looked to the day when the myriad parts necessary for the upkeep of assault boats would be unobtainable anywhere. He ordered a foundry to be built. Off to the left of the assembly plant, this little foundry now melts its metal and casts parts that even an overriding priority order couldn't get.

The machine and engine shops are a steady drain on the foundry's production. Lieutenant William F. Lehr, a mechanical engineer and machine designer for the Standard Oven Company of Pittsburgh, and later its Vice President and Chief Engineer, runs the engine shop. He's like a father

talking about his child when he takes a visitor through his plant. But that's the thing that impresses you about the depot. Everyone feels that way about his own particular job.

"See those stands?" says Lieutenant Lehr, pointing to where a row of Gray Marine engines is resting. "Well, if you bought them, they'd cost \$200 apiece. We made 'em from scrap metal, and gave our student welders good practice at the same time."

Lehr's shop is really an industrial assembly line on a reverse basis, a repair basis. The dirty, rusted, damaged engines begin at one end, to be torn down, and in 24 hours they emerge at the other end, reassembled, tested, their running records tabulated, ready for reissue to any craft needing a new engine.

One tricky thing in rebuilding an engine is to be sure that its parts are whole. You may say, "Oh, that's simple. If a part is cracked you can see it." You can't always see those cracks that might stop an engine and a craft halfway to an enemy shore.

But there's one sure way of getting at those cracks you can't see. It's done by a machine called a "magnaflux." Parts are dipped into this vatlike box and magnetized. Then powdered iron oxide is poured on the parts to be tested. Particles of this reddish powder will show in outline any minute crack not discernible to the naked eye or to the touch. If this line appears, the parts are rejected, to be salvaged and used for something else.

If you bought a magnaflux machine it would cost around \$8,000. Lieutenant Lehr, out of salvaged parts and \$300 for new pieces, built one in 2 weeks.

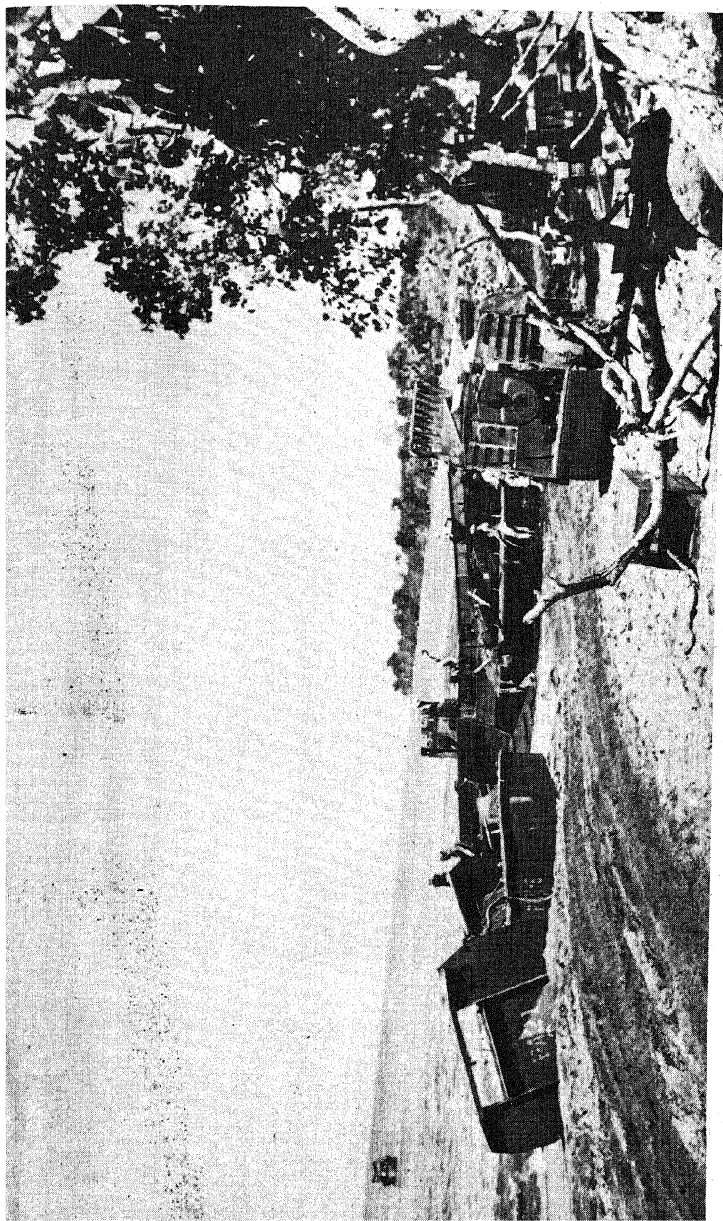
Beyond the engine shop there's the instrument and tachometer shops where delicate mechanisms are adjusted, cleaned, and repaired. There's even a typewriter shop, whose value, if anyone has tried to have his old Underwood fixed these days, will be realized. And there's one bench where men of the depot can get their watches repaired. Ernest C. Anderson, a Motor Machinist Mate Second Class, of Twin Valley, Minnesota, is the man who does this. When he reported to the depot and found many men timeless, due to the fact that Norfolk jewelers guarantee only a minimum of 3 months to fix a watch, he sent home for his repair kit. He'd been a jeweler himself before the war.

Lieutenant Lehr also joins the chorus of "there's nothing we can't do." He cites, for an offhand example, the time someone wanted two boats completely changed from gasoline to Diesel. They didn't think it could be done in the time allotted, 4 days. Then the Bureau of Ships in Washington said, "Send your job to the equipment depot."

The engine shop in the depot did the job in 3 days and delivered the boats under their own power.

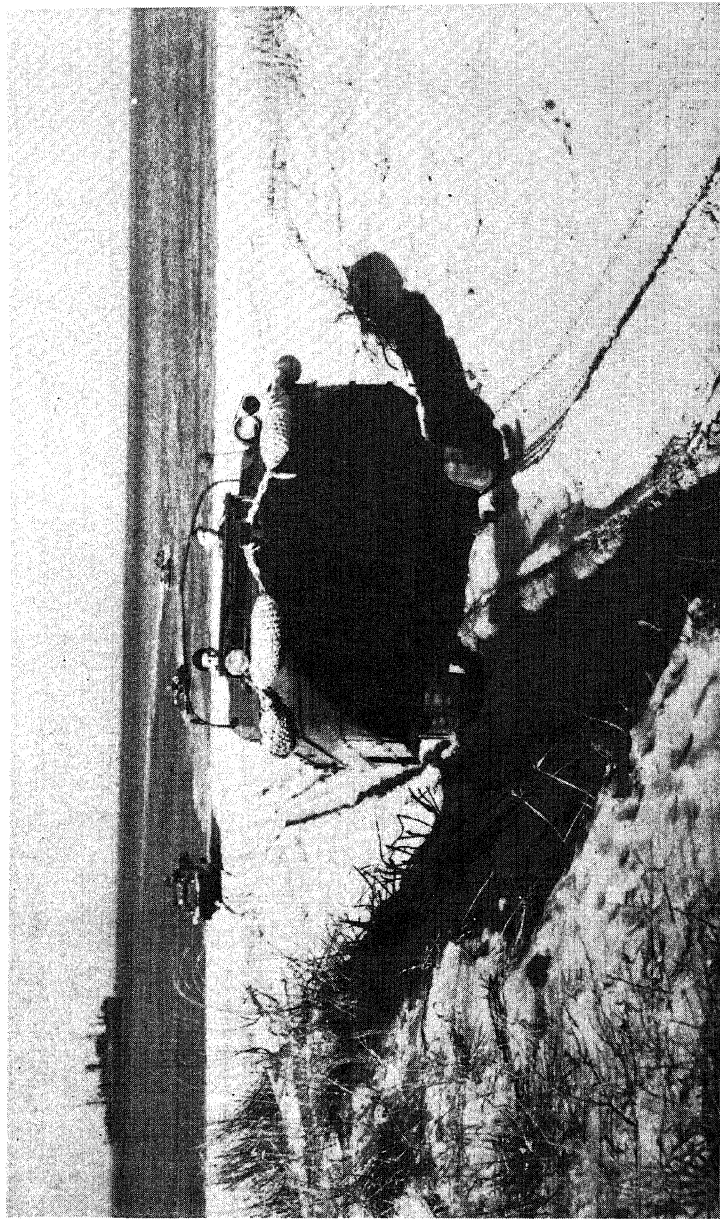
The machine shop, which operates on a 24-hour basis, runs on equipment which, with the exception of two pieces, is entirely salvaged material. Planers, lathes, and similar heavy equipment were taken from other yards which had discarded them as worn out. They were reconditioned, rebuilt, painted, oiled, and put in perfect working order.

Many of the parts made in the machine shop are destined for repair bases overseas. This meant a need for wooden boxes to ship them in. The depot built a little box factory for this purpose, which turns out an average of 75 wooden shipping crates a day.



Official U. S. Navy Photograph

BROACHED BOATS ON BOUGAINVILLE BEACH



Official U. S. Navy Photograph

THE DUCKW'S COME ASHORE

There was a paper shortage in the country and waste-paper could be sold. The depot had quantities of waste-paper, so Captain Laird bought an old hay bailer from a Virginia farmer for \$100, rebuilt a little gasoline engine to run it and now bales a truckload of paper every week to be sold.

As the personnel increased in the depot, cafeteria and cooking facilities were needed. It was impossible to buy a steam table, so the metal shop made one.

Instead of sending out crankshafts and cylinders of damaged engines to be chromium plated, the depot constructed from salvaged material its own chromium-plating room.

A parallel job that runs simultaneously with repair work is the training of men to go out to advanced Navy amphibious bases. These men are trained to fix any part of any landing craft under any condition. That is why Captain Laird had told them, "It doesn't grow on trees." At the depot they are given a sound working knowledge as a foundation. Then, if the men have to work under improvised war conditions, they will at least have a standard of work from which to begin. The aim of the depot's training program has been to make that standard an excellent one.

"We don't give a damn," said Captain Laird, "if a man can't read or write. If he can fix a damaged engine, that's all we care about. One thing we try to do here is to keep the men ignorant of what they *can't* do. If they make an engine part here, when they get to a foreign base they'll know how to do it again.

"An example of this was an order we got one day to weld some bullet-proof steel. We started on the job. Then came a follow-up letter saying, 'Never mind, you can't do it, you

can't weld bullet-proof steel.' But in the meantime we'd experimented. We found a way to do it, and wrote back saying, 'Sorry, we're just ignorant. We didn't know it couldn't be done. We tried it and did it.' ”

The captain figures that his pool of 1,800 trainees, who sleep in quarters where Ford parts used to be stored and mess where the old assembly line stood, produce about 50c on the dollar in production output as they learn their jobs. As they train they also work in turning out production items. They begin on scrap metal that is useless for anything else. In the blacksmith shop and the welding shop, instruction material is all scrap. Huge waste buckets are filled with weld-ribbed scrap. Every weld turned out by a student is tested. It is put in a viselike machine and bent. The weld must be good enough to stand anything from a 45-degree bend to a flat bend without breaking. If it does break, the student is shown his mistake and welds a piece until it will stand the bending test.

The men are sorted and shifted according to their abilities. In the compass shop is a boy who began work on heavy lathes in the machine shop. It was discovered that he was good at precision work, and he now winds intricate electrical compass motors.

These men may not have the equipment on the spot, in Africa, Italy, India, or any of the Pacific islands, to do a job, but they will have the knowledge of how it should be done and how it can be done with what they do have.

They could even build a fire engine like the one guarding the depot. It was built by the men there. It vies with the Yard Bird in looking like a toy, but it works. The source of its parts was as varied as the figures on a compass face,

but when the parts were assembled it was an efficient little fire engine.

Four Ford wheels, an old salvaged pump, a hose attachment with five outlets, and a reconditioned motor, placed on a frame and all painted as red as Commander Llewellyn's bicycle, and there it was.

The whole tenor of training and of the philosophy that built this depot is expressed in a statement that Captain Laird made one day when an officer reported that a man on a certain job was stumped, couldn't figure out how to do it.

"Who the hell is going to fill their bottles and put on the nipples for them when they leave here? Let him find out how to fix it!"

The man found out. It took a little plain sit-down thinking, but he figured out how to do it. The next problem that arose he knew how to tackle.

These are some of the men behind those invasion boats that carry the troops ashore.

The Boys with the Stereopticon Eyes

THE plane took off from a North African airfield and headed out over the Mediterranean toward Sicily.

"This is your objective," the officer in the operations room had told the pilot, handing him a map of Sicily. He had pointed to a square section of the beach on the southwestern shore. "It's very important. It's our last run."

The shore line of Africa melted into blue water. The pilot checked his course, settled back in the seat and looked at the spot of Sicilian beach marked on the map. Over 500 times, planes had left their North African bases like this. The pilots had been given a map with a little square marked on it and were told, "This is your objective." This trip would finish the job.

Clouds floated by below, milk spots on a blue carpet. These trips were not larks. Those white clouds often had a dark lining of enemy aircraft. Only about one plane in 10, out of the 500 that had headed in for their objective, did so without meeting enemy planes or antiaircraft flak from the ground.

The gray island coast line appeared, like a chip of bark floating in the water. The pilot checked his map again. His target was a little to the north. The green hand on the altimeter pointed to 30,000 feet as he started the target run. In a few seconds he was over it, a tiny spot of land about the size of a silver dollar. A gloved finger found the button and pressed.

The plane banked and turned for another run.

"One for good luck," the pilot said to himself.

Sometimes the planes had to go in for a second run, if flak from below jarred their craft as it passed the target. This day there was no flak nor any enemy planes to mar the sight. But it was the last trip and it had to be good. At best, this job was like trying to hit an ant with a marble from the top of a barn.

Again the small bit of land, corresponding to the area marked on the map, appeared below, and again the button was pressed.

That should do it. The job was finished now. Not quite—it was *almost* finished. The pilot had to get safely back and deliver a precious package—the photographs that he had been taking. In that black package was film, a picture of the land marked on the pilot's map. This area was near one of the beaches on which we were to land. Previous pictures of this strip of island had indicated the enemy was building something. We had to find out what it was. If it was a big gun nest, then it was a target that rated first priority from ship and artillery fire.

Over the North African airfield again, the plane circled, waiting for the signal to land. It came, and the plane eased

down in a long glide. Wheels slapped the gravel and rolled to a stop at the end of a taxi run.

The pilot stepped out. Under his arm was a small black package. A dispatch rider in khaki battle dress and round bucket-helmet was waiting. He signed a receipt, put the black package in his shoulder bag, and roared away on his motorcycle.

As a result of this flight and the 500 odd preceding ones over Sicily, the converging task forces closing in on the island on the night of July 9, knew, with 98 per cent accuracy, the exact location of enemy guns and troops. That is why we landed in the south of Sicily instead of in the previously planned northern sectors where the enemy was expecting us. That is why our invasion force was not confronted with really stiff opposition. We were able to land troops where the enemy wasn't expecting us to land troops, where he was unprepared to repel an amphibious landing.

The night of the invasion we knew the locations of every airport, the length of runways, the number of hangars, the kind and number of planes there. Along the beach where we were to land we knew the location of ammunition dumps, fuel dumps, gun positions and the caliber of the guns. And we knew what the beaches were going to be like where we landed, the height of the sand dunes, the kind of trees and bushes behind them, and where barbed wire was stretched.

Before an amphibious landing is made on any coast line, these things, and many more, have to be known. How they're found out is one part of the pattern of amphibious warfare.

The men who tell us what the films show are the photographic interpreters, the "PI" boys.

Several sets of negatives are developed and delivered by

plane and dispatch rider to the PI's of the various units, British and American, waiting to strike.

Each of those 500 plane trips to Sicily had brought back film. The entire 12,000 square miles of the island was on film. Those early flights were as hazardous as a bombing run on Berlin. Most of the Axis air force was then based on Sicilian fields. The reconnaissance pilots who flew on these picture-taking hops had to be just as good on-the-nose fliers as men dropping bombs on a target, and their camera targets were just as hard to hit. They had just as little time to press the trigger on the camera shutter as the bombardier had to release his load of precision-aimed bombs. From 30,000 feet those miles of land below present an area of about $1\frac{1}{2}$ square inches.

The camera pilot had to be something of a twisting, turning, evasive fighter pilot as well, because the enemy doesn't want his secrets photographed. This no-poaching rule was enforced by enemy fighters and antiaircraft fire. You can't take a picture with a Focke-Wulf on your tail pouring buckets of lead at you, and you can't get a clear shot when the ack-ack is throwing your plane around like a Russian thistle in a March wind. When that happens you try to get away, then sneak in the next day, get the picture, and sneak out, you hope. Anyway, you keep going in until you get it. The PI's have to have it.

The PI's job isn't so dangerous as the camera pilot's, but it's just as nerve-racking—like trying to find a needle, not in a haystack, but in a Montana wheat field. Try identifying a 12-foot-long automobile some time on one of those aerial pictures. It's less than a dot on the photograph, about $1/100$ inch long. Then, remember that the gun pit of a

20-millimeter antitank gun is only about 6 feet wide and on top of that it will have camouflage.

Not only do the PI's tell you it's a gun pit, but they also tell you the caliber of the gun underneath the camouflage.

It isn't easy. It means hours of eye-aching work, of checking and double checking hundreds of photographs. But they get the answer, and usually they get it right. A lot of plans and lives depend on the PI reports made from those pictures. The answer has to be right.

About 90 per cent of our military intelligence comes from the combination camera pilot and the photographic interpreter. A refugee, a prisoner of war, or a spy may forget or confuse information. The camera's hard to fool. The information is right there in black and white. It comes in small pieces, but it's there.

After the fall of France, it was of particular importance to the British to know what Germany was doing on the Continent. The former easy process of crossing the Channel and looking was closed, so planes armed with aerial cameras were sent up and down the "invasion coast" of the Continent. They brought back uncontested evidence of Germany's plans. In port after port were nests of invasion barges.

Following the camera planes would go the heavy bombers to blast those nests. It was a continual process, out for pictures and back with bombs. And England was not invaded.

We sent a man to London to learn how the British could read pictures taken at such altitude so accurately. The answer was the old public-library stereopticon machine gone to war. Two of these aerial photographs, looking like a blurred patch of soiled oilcloth to the naked eye, when placed

under the powerful eyepieces of the new stereopticon, showed amazing detail, and in relief. It was like looking at a miniature town through the wrong end of field glasses. It was a long jump down to those buildings and boats, and at first you felt dizzy. Then detail after detail cleared through your consciousness. You could pick out houses, streets, people, and ships. You thought you were pretty good.

Then an expert told you what you were really looking at: a harbor, filled with two 20-ton transports, 5 destroyers, 75 invasion barges, 15 antiaircraft gun emplacements. The transports were loaded to the Plimsoll line. The invasion barges were armed. And off to the left was a railway yard, unloading ammunition which was stacked in 10 separate dumps. And away in that clump of trees was a fuel storage tank. Here was a story with all the pieces filled in.

Now look at this picture. This was taken of the same place a week later. Ammunition gone, transports gone, destroyers gone. Where? Look for more pictures and more pictures. You'll get the answer, and the enemy can't hide it. You found the ammunition later, in what the enemy thought was a camouflaged dump, near a new ring of gun pits. Those guns now rest in what used to be an innocent little field in one of the earlier pictures.

The man sent to learn this system of intelligence was Commander Robert S. Quackenbush. A flier himself, red-faced and steel-gray-haired, he spent weeks learning the British system of photographic interpretation. It took him only a few days to learn its value.

He returned to Washington, sold the idea to the Navy's Bureau of Aeronautics, and organized a PI school at the

Anacostia Air Station down near the Washington Navy Yard in January, 1942.

After the 6-week course, the first class graduated and went to the Pacific. On February 24, 1942, PI had its "first night." It was the attack on Wake Island. We had lost Wake on December 23, 1941. Plans had been made to give the Japs on Wake a taste of what the defending Marines had digested in their 18-day stand.

Only once, after the island fell, had American fliers photographed the Wake area. An Army plane had flown over at high altitude, but clouds covered most of his pictures. It was understood that the Japs were working night and day on new fortifications. We could destroy these if we knew what and where they were, but details were lacking.

The naval attack force sailed without them. But a Flying Fortress headed out for Wake. This time the sky was clear. The Fort returned to Pearl Harbor with a roll of film. It was developed and printed. The pictures were excellent. A Navy PBY, Consolidated patrol bomber, then flew the pictures to the aircraft carrier of the Navy force steaming toward Wake and dropped them on the flight deck. The pictures were quickly interpreted by the PI's. Their report went up to the task force commander and detailed sketches were made and the attack planned.

The public report of this attack was Communiqué No. 62. It read: "Two enemy patrol boats were sunk, three large seaplanes at anchor were demolished, and the airfield runways and a part of the defense batteries damaged. Our loss in this engagement was one aircraft."

A photographic interpreter, or a PI, has been described

as "a fellow who gets intelligence out of aerial photographs."

As the title indicates, he must be able, not only to distinguish what he sees in a picture, but also to interpret it in a military and economic sense. This interpretation is especially valuable in the pattern for amphibious attack. To carry out the first amphibious commandment, to "land where the enemy doesn't expect you," we must first find out where that spot is. Once this is established, then every available drop of information must be sucked out of that area and supplied to the men who are directing the force and the men who are landing. They've got to know if the beaches in that area are feasible for landing and if they are what points are best. The coxswain, a few minutes before H-hour, as he swings his assault boat around in the water alongside his transport, has to know, in better terms than a mere compass course, where he's going and what to expect when he gets there. The men standing by the guns on the Navy's big support ships have to know where their targets are so that when the hand drops for H-hour's beginning, they can train sights on it and blast all possibility of its interfering with the landing.

Our troops have landed because this information was supplied.

In the PI class that graduated in April, 1942, four ensigns went to the Pacific: George F. Bigelow, William McCarthy, Donald Telford, and Albert Sommer. At this time there were no PI's based west of Pearl Harbor. These four men were to do the first interpreting for Pacific amphibious landings. When they reported aboard Admiral McCain's

flagship, the executive officer naturally wanted to know what they were.

"We're photo interpreters, sir."

"What'll they think of next?" the Exec was heard to mumble. It was still a new term, a new job. Neither it nor its results were widespread knowledge. Both were soon to be, however.

The PI's first turned their glasses to harbor photographs and identified Japanese shipping in the Solomons area. Then, gradually, as the plans grew for the invasion of Guadalcanal, they began to study and report on Japanese airfields and gun positions. Very careful study was made on the field we now call Henderson.

All this was done aboard ship. In January, following the August invasion of Guadalcanal, a small unit of PI's was detached from the ship and assigned to the Marine Corps on Guadalcanal.

This was the unit that discovered the airfield at Munda from studying pictures taken of that area. They could see through the trees that the work of clearing the ground in a long runway stretch had begun. The trees hadn't been cut yet, but work had started on this airfield. American bombers left immediately and started pasting what the Japs had thought was a secret.

"The Japs didn't do so well on that strip," said Ensign Bigelow.

Another airfield was discovered on Kolombangara. It was Vila airfield and almost completed when the PI's caught it. A month earlier, pictures had shown nothing but solid vegetation. In 30 days the Japs had practically constructed a complete airfield. Ground reports had brought indication

of suspicious activity on Kolombangara, in the New Georgia Islands, so planes went out to take pictures. The field was cleared and level, except for a tuft of palm trees still remaining in the center.

The field was bombed steadily and PI reports found that only one lone Jap plane had ever used the field.

One day a pilot delivered a packet of film, one strip of which had no caption. The pack was developed and printed, and the PI's began to look at the day's run.

About 10 o'clock at night an excited shout from one of the PI's brought the others running.

"Look what we have here!" he said, eyes bugging. It was a new base, construction almost complete, with airfield, runways, and Quonset-type huts.

"The admiral better see that. A base like that is hot stuff," someone said.

The first PI, knowing the admiral would immediately ask its location, started to find the pilot who had failed to identify his shot. The pilot was sound asleep in his bunk when the PI finally found him and routed him out with a rush of words.

"Where the hell did you get this?" the PI asked, showing him the printed picture of the new base.

"Oh, that," the pilot said, sleepily. "I had one more picture left on the roll of film when I finished today, so I made a picture of our base here when I came in."

The PI's went to bed, thankful they hadn't called the admiral.

Another job of the PI's here was to confirm hits on enemy shipping. Pilots coming back after a run on an enemy ship were certain they had scored. They'd seen smoke, the ship

covered with water, and all evidences of a bomb-punched Jap vessel. It was up to the PI boys to make the decision. It's pretty hard to tell for the few seconds you're over a boat being bombed whether you've hit it or not. But the cameras attached to the plane would bring back the story.

Time and again it was, "Sorry, Joe, no soap. You got a good near-miss, but no direct hit."

"It was very discouraging for some of the bombers," said Ensign Bigelow. Finally two of them had a \$50 bet on the first to get a direct hit. About a week after the bet was contracted, one of the pilots came rushing into the PI lab with his film.

"Come on, boys, doctor this stuff in a hurry. I wanta pocket my fifty."

The film was printed and the pilot stood around on impatient feet, waiting for the verdict. The PI boys were enjoying the suspense as much as the pilot was annoyed by it.

"It's a damn near-miss, Mack," came the fateful decision.

"It took that pilot a week before he'd speak to us," said Bigelow.

In July, Commander Quackenbush joined the unit, bringing more men and more photographic equipment. As invasions spread, units followed to Rendova, the Russells, New Guinea, Vella Lavella, Bougainville, the Gilberts; north in Attu and Kiska, PI's were methodically jotting down secrets the Jap couldn't hide.

Commander Quackenbush was awarded the Legion of Merit, and the PI's on Guadalcanal were given the Presidential Unit Citation along with the Marines.

Interpretation of aerial photographs of Sicily began several months before the invasion and in widely separated

places. Army and British units in North Africa began collecting pictures and scanning them, jotting down notes and reports. In the Nansemond Hotel, PI's of the Amphibious Force were doing the same thing.

Pictures came from a variety of sources. The recent ones were obtained by U. S. Army and British reconnaissance pilots. There were also old pictures in the files. When war first began, both Army and Navy had let it be known that they could use any pictures that Brownie-packing tourists might have brought back with them from globe-trots.

These pictures poured into Washington in profusion. Most of them were absolutely useless. One in 500 might be good, one in 1,000 might have valuable information in it. They were all inspected, the good ones filed according to geographical locality.

The amphibious PI's had one of these donated pictures thumbtacked on the wall of the office in which they worked, as a constant reminder of the specialized interpreting needed for amphibious assault. The caption on this picture was in large, inked letters. It read: "An example of rugged beach terrain with three dangerous obstacles firmly implanted in sand."

It was a beach in Southern France with three blonde beauties lolling in the sun.

The man in charge of the Atlantic Fleet Amphibious Force PI's who worked for our task force on the Sicilian job was Lieutenant Commander George Dunbaugh, USNR, an expert photographer himself, who wears the silver wings of last war's Army Balloon Corps.

Twelve to 14 hours a day were spent on the stream of pictures pouring into amphibious headquarters. When

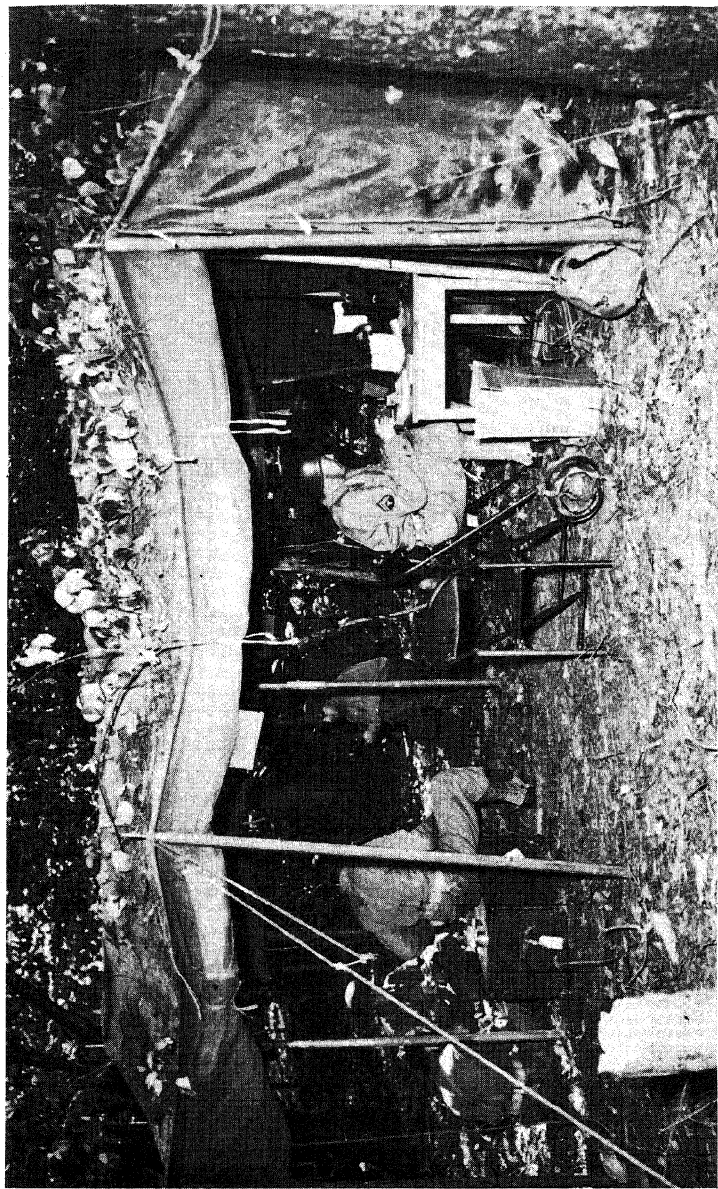
strategy shifted from the north to the south of Sicily, the hours behind the locked doors of the old Nansemond Hotel increased. Some of the men suffered from eyestrain, or the "stereo-shakes" as they called it. The hall silence was sometimes shattered by a whoop of delight. A PI had discovered the answer to a knotty problem. Maybe the problem had been a small blurred mass that appeared regularly in every sequence of pictures on a certain area of land. No one could say definitely what it was. Then a picture came in that had caught the enemy with his camouflage down. It was a 40-millimeter gun pit, and the secret was marked.

Reports grew from the hours spent on these pictures. The beaches took shape in long strips of mosaic, showing defenses, inland terrain, and harbors. The Air Department got reports on airfields within striking distance of the beaches, in Sicily, Sardinia, Corsica, and lower Italy. The Gunnery Department wanted grid coordinates, aerial maps, of enemy defenses within the reach of naval gunfire. These would be used by both the ships and the naval gunfire liaison officers who went ashore with the Army.

When the task force left in June, four PI's were aboard the flagship: Lieutenant (jg) Charles Coleman, Ensign Frank Earle, Ensign Lester Haas, and Ensign Charles Spooner.

When the dispatch rider raced off with the packet of film from the North African airfield, one set of negatives was destined for these PI boys who were waiting with the task force in Oran harbor.

With this latest information, final PI reports were completed. To the gunnery officers went gridded mosaic prints of the landing area. These were received with such praise



Official U. S. Navy Photograph

THE MESSAGE CENTER



THE LCPR
(Landing Craft Personnel-Ramp)

that similar prints were given to the air-liaison people, transport commanders, and Army battalion commanders.

Ready for distribution were the beach reports in a small folder, containing an oblique view of the beach, a sketch of the shore line with a legend giving the dimensions of the beach, a description of the beach, surf figures, outstanding landmarks, the best approach to the beach. For the Army's use, terrain inland and on the flanks of the beaches had been described, showing exits from the beach where rolling equipment could be taken, locations of airfields, places suitable for concealment, areas for dispersal, and strategic distances marked.

A conference was called when this material was ready to hand out. The ships of the convoy had been sealed. No one was allowed to go ashore or come aboard. The PI reports were passed out, company and battalion commanders were briefed in just how the operation was to click. The pictures were explained and all questions answered. Coxswain groups and platoon leaders were shown exactly where they would land and what kind of beach their bow ramp would lower on.

The same briefing meetings had occurred in the other task forces. Gunnery officers knew their targets and from the gridded mosaics could get the range with the first salvo. Pilots of cruiser planes and the naval gunfire liaison officers had identical mosaics to check the fire. Coxswains were armed with the confidence of knowing they were landing on a beach, not at the base of a 100-foot cliff. Army officers had a preview of the land they would be fighting on in a few hours.

H-hour would test the accuracy of all the PI reports and recommendations.

A few hours after the first wave landed, two PI's, Lieutenant Coleman and Ensign Haas, went ashore to check the ground with what their stereopticon had shown from 30,000 feet. They were certain of their reports, but things have a way of looking different when seen from a vertical view of an aerial photograph.

Early in the day an Italian colonel was captured. Here was an excellent check for the PI data. Ensign Haas could speak Italian. The colonel, a small, paunchy man with a clipped, black moustache, was willing to talk.

The PI's had discovered 4 gun batteries with 34 machine guns along the beach area. The colonel, when asked, gave the figure of 3 batteries and 29 machine guns.

"Come now, you have more than that. We know it," he was told, and Haas began citing their locations. The colonel marked a "perfect" after every location named by Haas, then explained his discrepancy by stating that several gun posts were not manned, hence he hadn't considered them.

The colonel was then shown a copy of the shore-line sketch.

"That's the best map I've ever seen of the Scoglitti area," he answered in excited Italian.

Haas then proceeded to point out on the map the exact location of his batteries and gun positions, even giving him dates when some were first occupied.

"What good intelligence!" was the only thing the astonished colonel could say.

The Very Model of a Modern Battlefield

A FEW days before the Sicilian task force left America, truckloads of big, long, thin crates were dumped on the docks to be loaded aboard the transports. On the rough wood of each crate was stenciled the code number of a transport. A group of these crates had the number of the flagship on their boards. All other transports were to get one crate each.

Just before the ships sailed, the crates were loaded. Special crews handled them. Extreme care was used in getting them up and over the rails to the deck. They were not stored in the cargo holds, but taken to certain cabins where tables had been made to hold them. The tables were of ordinary height, but slanting, like the reading tables in a library, with a flange along the lower edge to keep the crates from slipping off.

The crates remained on these tables throughout the Atlantic crossing. No one touched them, and the rough wood slats remained nailed tight against curious eyes.

Very few people knew the contents of the crates and they weren't talking. Those people knew what the crates held,

knew our invasion objective, and couldn't talk until the ships had been sealed and we were under way on the last lap, of which the next stop would be enemy territory.

During the layover in Oran the four men that accompanied the crates worked very closely with the photographic interpreters, taking notes on their latest information and studying with minute care the last pictures received.

Then came the order that ships of the task force were sealed. No one was to leave or come aboard without specific orders. The night the ships filed out of the harbor entrance and formed their convoy pattern, the slatted covering over the crates was removed.

We had been told we were going to Sicily. And now, on those slanting tables, with their protective covers removed, we saw perfect plaster models of the entire area to be attacked. The model was in sections, butted together, forming the complete coast line of Sicily from east of Scoglitti to west of Gela. No detail was omitted, from the soft-blue Mediterranean running up to the buff-colored beaches, to buildings, streets, and fields beyond the shore.

Incredulous eyes examined this miniature battlefield and curious fingers disregarded the "Do Not Touch" sign to feel the contour of the beach, the soft curve of a hillside, and the waffle-iron pattern of little villages.

The flagship had a complete set of these models, showing the entire task force area. Aboard the other transports were single models, in larger scale detail, of the exact beach on which the troops they carried would land.

From last-minute photo interpretation, details were checked, some added, and some changed. Troops had before them, for study, as nearly a perfect model of the beaches

and land on which they would fight in a few days as combined intelligence could supply.

By the time they had studied and memorized the details of the model it would be like leading a tour to the old swimming hole.

When the PI's held their briefings, it was in the cabins containing the models. Men could check their beach reports and aerial photographs against a three-dimensional model. When the report spoke of a certain beach, there it was, on the model in detail. Roads running from the beaches were marked in red lines. Fields, hills, and shore-line landmarks were there. When the assault-boat coxswains met for briefing they were taken in to the models, shown the position in the water where the transports would anchor, and the beach where they would land their craft. The model had directional aids marked on it; some, for the use of the Gunnery Department, were gridded. Targets to be blasted were marked. The gunnery officers could study the position of these targets days before they would train guns on them.

This particular preparation for an amphibious landing represents months of minute research and thousands of skilled man-hours of labor.

The models on the ships bound for Sicily were a second set. Another complete set of the northern coast line of Sicily was stored, back in America. Work on the first set began in the spring. One hundred and forty plaster models were completed when word came that the southwestern coast line would have to be modeled. The modelers hastily assembled new information and started casting. In 4½ weeks, 150 new models were finished, crated, and packed aboard the convoy bound for Africa.

General Clark, Commanding General of the 5th Army, at that time waiting and finishing final rehearsal for the September 9 thrust at Salerno, saw the models and realized their value.

"Let us know when you need some for your next campaign," said Admiral Kirk, "and we'll see that you get a set."

General Clark's order for a set of models came to the Amphibious Force in late summer via the chief engineer's office of the War Department.

An original model and mold of the area in which General Clark was interested had been made by the engineers at Fort Belvoir, Virginia, under the direction of Major F. K. Wilson.

This model was sent to the Amphibious Force with the request that additional casts be rushed for immediate delivery.

Between the time the plaster models of Sicily were made and the time this request came through, experiments had been made in finding a new model material. Plaster had definite disadvantages. It was heavy and fragile. If not handled very carefully, it would crack and break.

Working with the rubber experts of the United States Rubber Company, the Amphibious Force model shop had discovered a rubber plastic that was easily modeled, flexible, and light in weight.

When the Belvoir original arrived, with it came word that this was a super-rush job. There was not enough rubber material on hand at the model shop to turn out the order, so Captain J. W. Whitfield, Commanding Officer of Camp

Bradford, Virginia, where the model shop is located, placed a truck at the disposal of the modelers.

Two drivers were assigned to the truck with orders to get to Connecticut and back pronto with a truckload of rubber. While the drivers were making a taxi dash look slow, the other men in the shop began building molds, based on the original Belvoir model, from which to cast the new rubber models.

By the time the truck returned, the molds were ready. Shop personnel was split and put on a two-shift basis. The first shift worked from 8 A.M. until 10 P.M.; the second shift from 7 P.M. until 6:30 A.M. The men ate and slept in the shop.

In 3 weeks, 168 models of the Salerno area in Italy were cast, hardened, painted in natural color, crated, and on their way to Washington. They were rushed to the airport, loaded on a bomber bound for North Africa. They arrived 2 days before General Clark's task force left for Italy.

This transport problem would have been impossible with plaster models. With rubber, the plane was able to load and fly the complete set to the waiting ships. The weight difference was considerable. Plaster models weighed 75 pounds per four square feet, while the rubber weighed only 15 pounds and could be rolled, if necessary, for stowage in tight places.

Many models like these are being built today in Allied shops throughout the world, from advance Pacific outposts to the British Isles. The Army engineers are also model builders and there's a model shop on the Anacostia Naval Air Station in Washington. But few, if any, turn out mass-

produced models in quantity equal to the Atlantic Fleet Amphibious Force model shop.

The birthplace of these model battlefields for an amphibious landing reminds you of a combination bank vault and a kid's dream of Santa Claus's workshop.

The shop at the Amphibious Training Base, Camp Bradford, Virginia, is a two-story former barracks building, converted into a fantastic little factory of make-believe. It's like a group of H. G. Wellsians creating little worlds behind locked doors. Only these worlds are real, localities held by Axis armies doomed for amphibious invasion. You see man-made mountains, lakes, and islands. You see trees whose foliage is green sponge and whose trunks are copper wire, which do not look like sponge or copper wire at all. They look like real trees seen from the bomb-bay doors of a Liberator.

You see table after table of tiny, red-roofed houses, bright little oil tanks, and water towers, Lilliputian cities with spreading avenues, and fields, whose crops even a city-bred invader could identify. The smell of banana oil, clay, and metal shavings wafts through this toyland assembly line.

These are serious toys, to be studied by pilots, bombardiers, and landing-craftsmen. All these things will go into models, so real that a boy from Brooklyn, when he lands on that spot, will feel like saying, "I've been here before."

When the model is finished, it is photographed under varied light and cloud conditions, clouds being painted on a backdrop to the rear. Silhouettes and shore lines of places we can't get to come out in pictures as clear and correct as if the photographer had stood on the actual beach with a wide-lens camera. These pictures follow the models aboard

the transports. They are the simulated day and night shots of shore lines with compass bearings for the use of small-boat coxswains.

The easiest way to make these models, and no method is "easy," is from maps. On a map of two dimensions, the contours, heights, valleys, and mountains are shown by lines and legend. With this as a basis to work from, the map is blown up photographically section by section to the scale desired for the model. The contour lines of these sections are then traced on plywood or other material. Layers of this material are cut in the shape of the contour.

Mountains and valleys are made by stacking these layers one upon the other like a set of pyramid blocks. The terraces between the layers are then smoothed over with a plastic clay, ravines molded in, crags and peaks put on. In order to do this realistically, aerial photographs are studied and the photographic interpreters help locate with their stereopticon glasses the size of cliffs, the shape of canyons and hillsides.

Rivers, towns, and all the landmarks of the vicinity are put on this master model. From this plywood and clay creation the female mold is made.

A firm frame is built around this model and plaster poured in. When dry, the frame is removed, leaving a smooth, indented impression of all details. This is the mold. From this the final models are made. The plastic is sprayed into the mold, dried, and removed. The finished model is a smooth relief, identical with the first, an intricately put together clay and plywood model. From the indented mold, countless models may be cast in mass.

Details too intricate to be molded are painted in, enemy

defense positions marked, roads painted, everything given the color that it would naturally have when viewed from a distance.

For a model of areas that have not been mapped, the procedure is somewhat longer and more difficult, but the result is just as accurate and the detail as correct as if the modeler had spent his boyhood there.

For these models the beginning is an aerial photograph. From this picture, a photogrametist makes a map. By interpreting his picture with the stereopticon glass, he indicates the contours on his map. It is unbelievable what modelers can do working only from a picture. It's like giving someone in India, who has never been to America, or seen a North American map, an aerial photo of Long Island and having him turn out a relief model with every bay, inlet, road, and town so accurately placed that when he came he could drive from Brooklyn to Shelter Island without once asking a traffic cop for directions.

On other tables throughout the shop are rows of little ships, every type used in amphibious warfare, correct in all surface detail. These are the model ships used on the maneuver board, an aid employed in the training of new troops and officers in the tactics of an amphibious landing. They see in miniature what they never see in an actual landing. They see how the transports assemble off the beach, how the assault craft rendezvous and go in, where the naval support ships anchor, and what each type of vessel looks like. They see the tactical pattern of the entire task force, which in full scale is too large to comprehend easily. They see how each ship fits into its place and how it functions. In this way each man better understands his own small job.

The model shop lies at one end of a Company street, nestled in high pine trees. Guarding it is a high, strong cyclone fence. On the gates of the fence is tacked a sign, "Keep Out." The gate is locked and it's easier to enter a metropolitan bank vault without identification than to get by the sentry at this gate unless you have business inside.

When the men in the shop are working on operational models, no one leaves the building. Food is brought in and the men sleep in bunks on the second floor, for behind those locked doors lie many secrets.

The modelers are responsible men. They are skilled artisans with prewar art, modeling, or sculpting experience. The man working on an LCT model, fitting it together with a careful touch and painting the sides with deft, sure strokes, has had 15 years' experience in the automobile finishing business, and before that he built racing cars. The Shipfitter Second Class, Clyde Code, who is working on a model LST, was a plumber before the war. He knows the metal he's working with and what he can do with it. The man who takes the pictures of the models showing how the invasion coast will look at dawn is Photographer First Class, Arthur Tole, of Summerville, Massachusetts, a photography-laboratory specialist with General Foods before the war.

Most of the men working here are older than the average sailor. They have been picked for the job because they're experts in this field, and this is a job for experts. Among the modelers is Seaman First Class John Haley, who was an art professor at the University of California. Working side by side with Haley in his sailor's dungarees are Sergeant Ivan Rigby and Corporal Robert Kalli of the Pratt

Institute of Art. And there's another Army man, Corporal Anthony Vaiksnoras, an artist from Cleveland.

The man who supervises the model shop is Lieutenant Commander George Dunbaugh. The officer directly in charge of the men in the shop is Lieutenant (jg) Robert Zeidman.

Zeidman began his career making little models of big things in Pittsburgh's Carnegie Tech., where he studied industrial design. After this, he worked for Designers for Industry, Inc., consultant designers for industry, making industrial models. These are more than drawings on paper. They're complete models. In other words, an idea for a new typewriter, theater chair, a piece of glass furniture, or a machine tool was first drawn on paper, then modeled to give visual appreciation. Industrial design is really "appearance design," a combination of engineering and art, or art as applied to industry.

In June, 1941, Zeidman enlisted in the Army. He was sent to the Armored Force School at Fort Knox, Kentucky, which, at that time, had the largest technical school in the world. With his model-making background he was assigned to work on a new project under way, a model of the Gettysburg, Pennsylvania, area. This is an area of land about 300 square miles, a favorite Army spot for teaching map survey and tactical courses, and for tank maneuvering drills.

After terrain models of this area were made, the shop turned its tools to making models of German tanks. A miniature Panzer division was soon rolling around the Fort Knox model shop. Then came models of every Allied and Axis type tank. It was the most complete model set of its kind in the country.

The model shop at Fort Knox was the pet of the Tactical Section Head, Colonel E. J. Johnson. It was Colonel Johnson who came to Building 138 of the Amphibious Force to be Admiral Hewitt's Army adviser.

As plans crystallized for the North African invasion, the job of making models of the assault areas was turned over to the Fort Belvoir engineers. The models were made and placed aboard the flagship. They proved to be so successful that the recommendation was made to have all ships in the next invasion supplied with models. This meant a mass production of models would be necessary.

Colonel Johnson remembered his Fort Knox modeler, Sergeant Zeidman. Going to Commodore Johnson, he said:

"Why don't we get Zeidman up here with the Amphibious Force and organize a model shop of our own?"

"Fine," agreed Commodore Johnson. "If it's agreeable with you, we'll ask for his transfer from the Army to the Navy and have him assigned to us."

The transfer was negotiated and Sergeant Zeidman of the Army became Ensign Zeidman, USNR, of the Amphibious Force. He reported to the Nansemond Hotel and began organizing his shop. Space was again at a premium. He was given an office in the photographic laboratory, already bulging with camera products and equipment. By the time he had outlined his program and needs for a model shop, it was seen that nothing short of an entire building of his own would suffice.

There was an empty barracks at Camp Bradford. Captain Whitfield had the base carpenters remodel the first floor, tear out the bunks and put up the protective fencing around the building.

On April 1, 1943, Zeidman with 11 Army and 34 Navy enlisted men entered their new shop and began to work. In their spare time, what little there was, between orders for operational models, they made terrain models of the amphibious training bases along the Atlantic coast, and as a breather from this, they built their own office furniture, designed by Zeidman. There were modernistic chairs and desks with curves that would feel at home in any New York reception office.

The men working in the model shop have a feeling of direct contact and contribution to the war possibly more keenly appreciated than in any other unit. Their work is tediously painstaking, but at the same time creatively exciting. They have the knowledge that at some future date, those little harbors they build, those beaches and mountains and villages will be stormed and taken by Allied landing teams. And they know that hours spent here on creating each detail from little more than a mere photograph and getting the details correct, will save lives of many men.

After Sicily, Admiral Kirk said, "In future operations there will be a model on every ship for every man to study."

This is what the model makers are doing.

Artillery Sailors—the NGLO's

H-HOUR has passed. The sudden shock of a silent night being ripped and sliced with rainbows of fire from a ring of big naval fighting ships is over. Waves of infantry have landed. Artillery and big guns are going inland from the beaches.

These guns know their targets from the battlefield models and aerial photographs. The sound of their barrage comes from a distance like muffled tap dancing on kettledrums. But there may be unexpected targets, enemy reinforcements brought in to smash the baby beachhead. Maybe the enemy will route this strength in a way to fool our artillery. But we have a surprise up our sleeve for him, too.

One of our forward spotters inland sees the enemy sneaking in a big mobile gun, setting it up, the crew working with mechanical precision to get the gun trained on our flank position. In a few minutes that ugly long snout of the Krupp barrel will belch flying steel from a position which our troops think is safe. Our artillery is fully engaged with another enemy gun position firing directly ahead of our advancing troops. It can't take on an order for another target.

The spotter, who sees this situation, glances at his map,

makes a quick notation, and writes a message on a piece of paper. He hands the paper to a radio operator next to him. This message is going to a cruiser waiting out beyond the transports. The ship has been waiting for something like this ever since the last wisp of blue smoke curled away from its gun muzzles at dawn.

The gunnery officer on the ship looks at the message, checks the position on his map, orders the guns trained and fired. A salvo of tons of metal shakes the ship as it leaves in a high arch. The spotter behind the beach watches. The shells fall and send up a fountain of sand and twisted brush roots. Through his glasses, he sees a surprised enemy gun crew look around as if asking, "Where in the name of Hitler did that come from?"

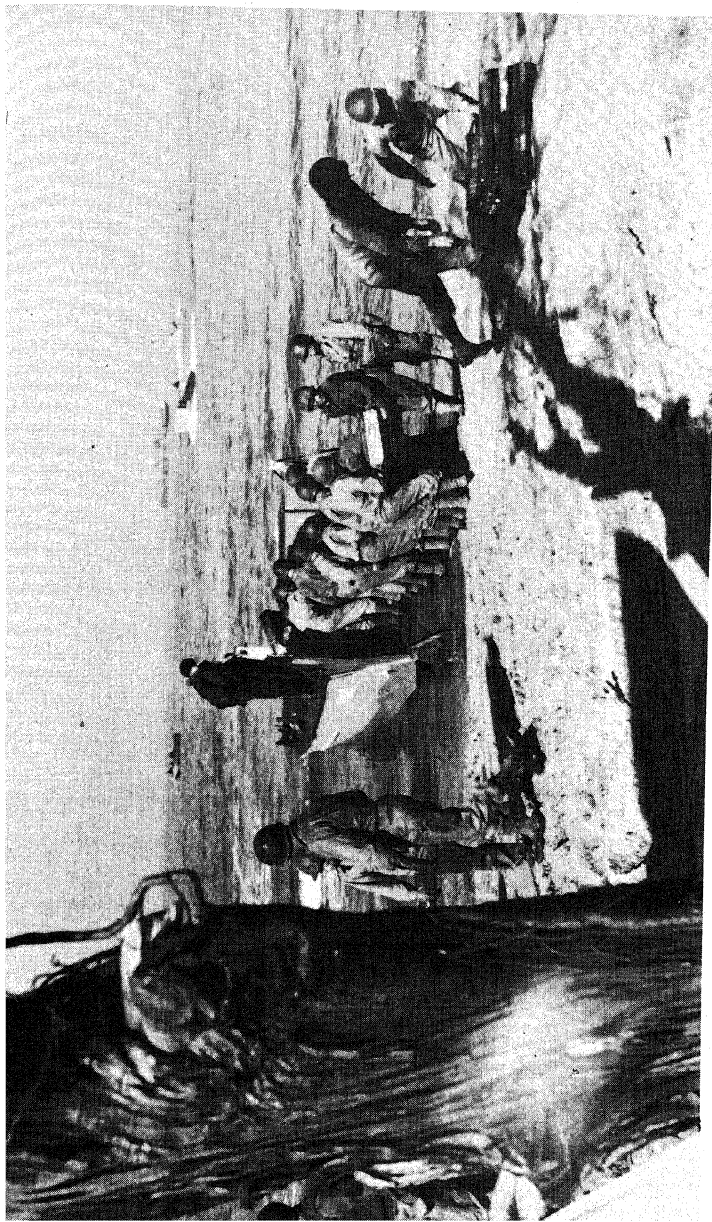
The spotter sends another message.

"Down, 200 yards."

The gunnery officer aboard the cruiser relays this message to his crew. The adjustment is made and another salvo leaves the ship.

The spotter looks. This time there's metal in that shell-exploding geyser, the base of the Krupp gun, and Nazi blood colors the dead grass. It's a direct hit.

That spotter was a Navy ensign, an NGLO, Naval Gun-fire Liaison Officer. Nine of these Army-dressed Navy ensigns went ashore with the troops invading Sicily. You couldn't tell they were Navy men unless you noticed the small gold ensign bars on light khaki shirt collars. They wore Army shoes, the green Army coverall, and helmet. Each man was attached to an Army unit whose commander could call for the fire of naval support ships before his artillery landed.



Official U. S. Navy Photograph

THE AMMUNITION COMES ASHORE



Official U. S. Navy Photograph

ARMY TRUCK IN LCM GOING INTO ESPIRITU SANTO ISLAND

The Navy man is part of a small group called the Shore Fire Control Party. This party consists of one naval gunfire liaison officer, one Army first lieutenant who is an artillery observer, and nine Army enlisted men with a sergeant in charge. The enlisted men are divided, four going with the NGLO and five going with the Army lieutenant. These men are all radio technicians, wire men, phone men, and operators.

When the Shore Fire Control Party sets up for operation it forms a triangle. One corner of the triangle is the Army lieutenant, the forward artillery spotter; a second corner is the Navy officer, who sets up his command post with his four enlisted men and radio. The third corner of the triangle is the group of Navy ships, called the Naval Bombardment Group, or the Fire Support Ships. A system of communication between each corner of the triangle is set up, so that when the Army spotter needs Navy fire, he calls the NGLO, who relays the target to the ships.

The naval gunfire liaison officer acts as liaison to the Artillery or infantry combat team commander. A combat team is a reduced battalion. The NGLO assigned to a combat team is usually an ensign. A lieutenant, junior grade, NGLO is assigned to the commander of a regimental combat team, which is three combat teams. An NGLO, of either the same rank or the rank of a full lieutenant, is assigned to a combat division, which is three regimental combat teams.

These NGLO's are the ones who go ashore with the Army. There are also others who remain aboard the fire support ships to act as liaison with the ships' gunnery officers.

One of the NGLO's who went ashore in Sicily was Ensign J. V. Cavanaugh, USNR.

Ensign Cavanaugh was working with the 3rd Battalion of the 45th Division's 180th Infantry. They landed on the beach about 9:30 A.M., just south of the Acate River a few miles below Gela. The immediate objective was a little town called Biscari. Biscari was important because it had an airfield, and airfields had to be captured quickly.

The beach held only American soldiers and warehouse-sized stacks of material when the 180th landed. They crossed the mined sand-dune area back of the beach and headed for the battalion assembly area about a mile and a half away.

By this time the first assault troops had pushed their way inland. There was no semblance of an organized front. It was a small group of men fighting their way inland. Some had been cut off and surrounded by German infantry and tanks which claimed severe casualties. Luckier units had moved forward without finding enemy opposition and were far in advance.

With such a staggered line, it was impossible to use naval gunfire without injuring our own men.

By evening our lines were more clearly defined. This was due largely to the enemy, who had organized a defensive line of resistance about 2 miles beyond the 3rd Battalion's assembly area.

Orders came for the 3rd Battalion to reinforce the assault groups going forward to engage this enemy line. As the troops advanced, the shore fire-control party looked for an observation post, a crest of a hill, a tree, or any high object which would give them a good view of the enemy positions.

Finding nothing suitable, Cavanaugh and his men decided to leave the radio in a jeep, which could be concealed from the air by a clump of trees. The line men then ran a

wire from the jeep to the edge of a large vineyard where our front-line troops were dug in.

The grapevines stretched out in long, well-cultivated rows. The big green leaves, curling fronds, and branches sagging with clusters of half-ripe grapes separated German and American soldiers. The German lines began at the other end of those rows.

It was quiet. The dusty smell of grapes heated by a July sun mixed with the sweat of trench-digging soldiers. The ruffle of grape leaves was a velvet silencer on the clink of spades biting dirt.

"I'm going down there and see if anything's happening."

It was Lieutenant Laverson, the Army artillery spotter in the Shore Fire Control Party. He pointed to one of the rows leading down to the German lines. With a phone in one hand and reeling out wire behind him with the other, he started. The grape leaves overlapped on the top of the row, making a long, shady tunnel converging in darkness at the end.

Lieutenant Laverson had crawled about 20 yards when the summer field shed its peaceful camouflage and became a battlefield. The Germans started a mortar barrage, well seasoned with small-arms tracer fire. Grape clusters danced little marble jigs at every concussion. Vines tore, and purple juice muddied the earth. The Shore Fire Control Party was pinned to the ground, unable to move. Then the guns of the 3rd Battalion opened up. For 45 minutes it was a terrific short-range duel. Spotting was impossible.

"I'm going to get the hell out of here and take the jeep where we can contact a ship."

It was the driver. He crawled back to where the jeep

and radio were parked under the trees. He made a quick inspection to see if the equipment was damaged and then jumped in and drove that jeep as few jeeps have ever been driven. Bullets poured after him like slanting rain, but he wasn't hit. The two rear tires were hit and flattened, and bullet holes on either side of him crunched into the dashboard, but driver and radio were unscratched.

The rest of the Shore Fire Control Party took a slower, but more cautious exit and joined the jeep on a concealed high spot. It was almost dark by this time and the firing on both sides had slowed to an occasional shot.

The men around the jeep looked at their map and the grid lines that crossed at the end of the vineyard where the German troops had elected to spend their last night. A message went out to the Navy fire support ships. And again the night was bright with exploding fire. Shells from destroyers were landing at the far end of the grape field.

By the time firing ceased, half the vineyard and the enemy lines were shredded. Cruiser fire was thumping into targets off in the distance. Those shells were falling on a similar target standing in the way of the 1st Battalion.

The rest of the first night ashore was spent in a slit trench at the battalion command post trying to sleep and keep warm without blankets. Artillery played an intermittent peekaboo game with enemy batteries.

Sometime during the night new enemy forces had moved up to the vineyard line. At dawn they began a counterattack. Our lines waited the order to advance. The Shore Fire Control Party returned to its post on the hill to the left, overlooking the Acate River valley. The lower end of the valley ran down to the beach where the transport cargo

made great dark mounds on the sand. Beyond the transports, Cavanaugh could see the destroyers crisscrossing, on the move, ready to deliver fire when called for. Then enemy firing increased, and for several hours the situation was critical. Cavanaugh called for a special delivery of some of those destroyer shells. They began to fall on enemy positions along a ridge above the 3rd Battalion. Gradually, the ridge contour changed like the rim of a piecrust being pinched by a cook. Then the destroyer fire was shifted to the valley where German infantry was edging around in a flank movement. At the same time, a German battery began shelling our only artillery emplacement, forcing it back to the sand dunes a half mile from the water's edge.

All the ships were firing now. Further up the valley, a group of German tanks were nosing their way down the natural approaches of the land, stream beds and ravines, in an attempt to penetrate our infantry lines. Their progress was slowed, but not stopped by bazookas and anti-tank guns.

Another NGLO, Ensign Augustus Allen, watched this tank menace and called for destroyer fire, giving the positions, range, course, and speed of the tanks. These targets were small and they were moving constantly. It would take good shooting and good direction to hit them, but the tank concentration had to be stopped. Eighteen hundred rounds of destroyer fire came crashing over the hills and around the tanks. Five tanks were splintered with direct hits. Even a tough Panzer man had never expected to face destroyer fire. The remaining tanks in the column reversed and disappeared inland. Ensign Allen was awarded the Navy cross for this bit of spotting.

About 4 o'clock that afternoon, the 180th Infantry began its advance. By dark it was several miles inland. Paratroops had been dropped near the enemy lines during the night. They fought along a road called Highway 115. By morning, only a few snipers remained to harass the advancing 180th. Crossing Highway 115 men saw the tattered score of an unequal fight, our troops against German tanks, but the first objective, Biscari, was ours.

The 180th advanced through the area given up by enemy troops. It was 4 miles to Biscari, through vineyards, almond orchards, and olive groves. Behind almost every tree was a neatly concealed slit trench.

The town of Biscari was not shelled. The enemy had left, slipped back to the hills. We entered with no opposition, but as soon as the first vehicles rolled into the narrow streets, the enemy began an artillery barrage. The battalion dispersed and dug in for the night on a hill on the opposite side of town.

Biscari airfield was the next day's objective. The enemy had blown up a bridge on the main highway from town to the field, which meant a 5-mile detour for all vehicles. Rifle-men pushed north on the direct route, covered by a heavy artillery blanket of our own fire. We were still within cruiser range, but our Army batteries were all in place now and pumping out more shells every half hour than they had fired during the first 3 days.

The naval officers were recalled that afternoon on the road to the airfield. They returned to Scoglitti and boarded their ships. At 6 o'clock came the news that the 45th Division had taken the Biscari airfield.

Sometime before H-hour we waited aboard the transports for a certain message. "Eighty Second Airborne Infantry landed, planes returning."

When that message came it would mean the paratroopers had landed behind the enemy lines. It would also mean that two NGLO's had landed with them, two Navy paratroopers, an experiment tried for the first time in the operations against Sicily.

The story of the Navy gunfire liaison paratroopers goes back to the spring of 1943, to a midshipman school at Cornell and Northwestern Universities. Potential ensigns were studying navigation, seamanship, communications and gunnery for their reserve commissions.

In March, the Amphibious Force Naval Gunfire Support School requested 24 of these officers, who had made good marks in gunnery. Twelve were selected from the class at Cornell and 12 from Northwestern.

They reported to the gunfire school and began immediate training in map reading, Army organization, and the study of military tactics with heavy stress on reading relief topography.

They began to learn spotting by practicing on a terrain board. This was a rough model of mountains, valleys, and roads. It had grid marks and map aids. A target would be selected by the instructor. The student would take his bearings, relay them to another officer who would adjust a sliding carriage underneath the model. When the student spotter thought he had the correct reading on the target he would order "fire." The man who manipulated the under carriage according to the spotter's readings would press a bulb which had a rubber tube filled with chemicals. A puff

of smoke would curl up through the burlap bottom of the model, showing the spotter the location of his shell hit.

This board gave the spotter practice in reading a map to locate the target. This was an all-important first step which must be mastered in order to relay the position of the target to the ship when actually ordering fire in the field. The smoke in relation to the target on the board was visual proof of the spotter's accuracy or error. At the same time it gave him correction practice. The operator of the underslung gear would intentionally place the smoke off the target and the spotter had to read the correction necessary to get the smoke billowing directly on the target.

By the time the students were proficient in the use of the practice board, they were sent to Fort Eustace, Virginia, to work with the Army.

Here, they learned the Army system of spotting, which differs in terms used from those in vogue in the Navy. It is necessary for an NGLO to know both systems. He may be in the field and have his Army partner killed. If this happens, he must be able to spot Army artillery fire in that position until a relief comes, and he must be able to do it in Army terms.

For example, suppose he is spotting fire for a Navy gun and the shell misses the target by, say, 500 yards. The NGLO relays this information to the ship by saying, "Down, 500 yards." If an Army man were spotting, he would relay that error by saying, "Over, 500 yards."

In other words, the Army spotter gives his gun crew the exact spot where the shell landed. In the Navy system, the NGLO makes the correction needed for a direct hit first, then relays *that* position by saying, "Down, 500 yards,"

bring your trajectory down 500 yards and you'll be on the nose. Or "Left, 500 yards," if the error is in deflection.

The students learned this system and practiced artillery spotting at Fort Eustace. Up until this time, all 24 men were receiving ordinary training for naval gunfire liaison work.

Nearing the end of the course, a request from the gunfire support school came for four of the students to work with airborne divisions. It was put up to the men on a volunteer basis. No other information was given, just four men to work with an airborne division.

Nine ensigns volunteered. These men were told that they would have an intensive 2-week parachute training course at Fort Benning, Georgia. They all left together by train and were met at Ford Benning by the public relations officer in a Recon car with trucks to carry their luggage. They were quartered with a company of Army officers just beginning their training. Word had passed around the base that the Navy was training paratroopers and some had arrived. The entire barracks turned out to see these strange fish out of water, Navy men turned paratroopers.

"What'er they gonna do, drop you guys on subs?" Or "Well, well, the new anti-sub weapon, eh?"

Anything new in barracks life is welcome, and this was plenty new.

After qualifying in 2 weeks as paratroopers the men returned to the gunnery school. Four ensigns were told to leave their things packed, that they were flying to Africa. Bill King, George Hulton, James Groesbeck, and Robert Seibert were the men chosen for this assignment.

They arrived in Africa and reported for duty. The orig-

inal estimate of four NGLO's to go with the paratroopers had now been reduced to two men. King and Groesbeck were assigned staff jobs, and Seibert and Hulton were ordered to the 82nd Airborne Division for additional training.

It was Bill King and James Groesbeck who were especially anxious during those waiting minutes before H-hour when the paratroop report would come in. It was a still longer wait for word of the NGLO's with the airborne troops.

The report of George Hulton came in first. He had landed safely behind the lines. But his body was one of those found after German tanks had left Highway 115. Seibert reported 4 days later with a story of wild hide-and-seek with the enemy. He, too, had landed safely, but found himself caught between two enemy machine-gun nests. He spent 2 days in a hole at the foot of a big tree with Germans soldiers almost within whispering distance.

North Africa was the first major amphibious invasion utilizing naval gunfire liaison officers, and the second time the team had been tested as an amphibious unit. NGLO's had also landed August 7, 1942, with the Marines at Guadalcanal.

Fifteen Shore Fire Control Parties hit the beaches of North Africa. Three landed at Safi; nine at the Casablanca area, and three at Port Lyautey.

The three parties that landed at Safi had little to do because of the light resistance. The nine in the Casablanca area had only a slight workout due to the confused nature of the fighting. But the three Shore Fire Control Parties at Port Lyautey found targets to fire at.

Ensign John Perry was an NGLO who landed in the first

wave of assault troops at Port Lyautey. Perry was twenty-two years old at the time, softspoken, with a moustache that made him look like Errol Flynn. One of the first objectives of this landing force was an old fort that overlooked the harbor. Perry's orders were to direct naval gunfire against this fort.

For 3 days the fort held out against bombardment, returning fire that pinned down the troops advancing on it. A mortar squad began lobbing its explosives into the American lines.

"I called for a destroyer, which was lying offshore, to direct its fire at this mortar location," said Perry. "That emplacement was silenced, and we went on."

On the third day, air support was called. The ground forces converged at the same time that Navy dive-bombers loosed their load on the old Moorish stronghold. Perry, who was in the forward position, with a group of about 30 soldiers, was the first to enter the fortress gates.

After this aerial assault the garrison was ready to surrender. Perry helped supervise the rounding up of prisoners, mostly Senegalese and Foreign Legion troops, stripped them of arms, and placed them under guard.

Six days after landing, Ensign Perry returned to his ship.

"The first thing I did when I got back," he said, "was to take a shower. It was the best shower I've ever had."

For his naval gunfire liaison work in North Africa, Ensign Perry was awarded the Silver Star Medal.

On the Sicilian invasion Perry was assigned as gunfire liaison officer to General Troy H. Middleton, Commanding the 45th Division. Ensign Kermit Peterson was another

NGLO who landed at Port Lyautey with a Shore Fire Control Party. The objective of this battalion was an airfield 8 miles inland. After a 2½-day push toward the airfield in the face of considerable enemy artillery fire, which Peterson spotted, food began to run low.

This was when Peterson noticed a tramp steamer entering the river with the apparent objective of scuttling herself to block Allied entry. Peterson immediately called for air support, explaining what was happening. Planes came and dropped bombs ahead of the ship, forcing the captain to beach his craft. This not only saved the entrance for Allied ships, but provided the battalion with welcome fresh food and some blankets. Peterson led a boarding party, stocked up on canned goods, including peas, horse meat, fruit, and some woolen blankets.

"That night we mixed a big bucket of hash, peas and horse meat," said Peterson. "It was good, if a little strange."

The next day, the airfield was occupied and Peterson returned to his ship. For his leadership and gunnery liaison work, Peterson was awarded the Silver Star Medal. On the Sicilian invasion he was aboard a cruiser as NGLO on the assault against the city of Licata. There's something about being trained as an NGLO that makes you want to get in a real fight and see if you're as good as you seem to be on paper. This was the case of Ensign John P. Gately, who had been assigned to go into Sicily with the 9th Division. The day before the task force left America, Gately slipped on a Jacob's ladder while going down the side of a transport. He fell into the bottom of a landing craft below and broke his ankle.

Ensign Joseph Amendolora, who had been disappointed

at being selected only as Gately's alternate, was now overjoyed at Gately's misfortune. It meant that Amendolora would go.

Gately was rushed to the hospital, mad at the world. He was to be madder still, until the humor of his situation struck him. Arriving at the hospital with Gately was an MP guard. The guard was placed in front of his door. Twenty-four hours every day the guard stood in front of Gately's door. Word circulated among the nurses that Gately was a spy, that's why he was being guarded.

It was all very embarrassing, but with a simple explanation. In his job Gately, naturally, had seen some maps. Intelligence officers were taking no chances on this information slipping out at an unguarded moment and getting to the wrong person. Sometime around our own H-hour, off the coast of Sicily, Gately had his own private H-hour. The guard was removed.

Of the nine NGLO's who went ashore in Sicily, only one was injured. One was awarded the Navy Cross, and seven received the Silver Star Medal.

The NGLO is truly a combined-service man. Each man lives, works, and trains with the Army division months before they land together. They even look like Army men with Army helmets, coveralls, leggings, and field shoes. It's a strange Navy job, and, as someone said, "You can always tell an NGLO by the medals he wears."

They're an important part of the Army-Navy invasion team.

We Call It a Party

BREAKFAST is eaten on the transports at daylight. The mess boys bring up on deck big cartons of Army K rations and pass them out to the officers and men. There is Navy coffee on deck, too, in 10-gallon tins. The strange, salty-sweet concentrated vitamin wafers in the K rations need dunking in strong coffee.

Reaction has set in. Nerves that had been tight as a bullfiddle string relax and tired men catch a snatch of sleep in sheltered deck space. The sun comes up over melon-green water and our planes circle in spiraling patrol.

You can hear gunfire behind the gray beach line, and nearer, the staccato fire of antiaircraft guns blazing at a low-flying enemy plane that tried to bomb one of our supply dumps.

Even from this distance you can see the beach, dotted with boats, small craft and the LST's and LCIL's, and beyond the boats are mounds of matériel. The transports have begun to unload. Spots of color fleck the beaches. Those colored banners are the beach markers, identifying certain beaches for certain kinds of cargo. They are the signs to guide the coxswains to the proper beach. The shuttle system from transport to shore has started.

The first phase of an amphibious operation is over. A "beachhead" has been established. That is, we have landed assault troops, destroyed enemy shore defenses, and the beach area is in our control.

The second phase is starting. This is the unloading of the transport cargo, and getting the supplies ashore to follow up the advancing troops, so that the transports of the task force can leave.

There are men specially trained for this moving job. In most amphibious landings, this team is an Army-Navy mixture. It's a job full of more headaches than a case of Bourbon. It means answering a thousand questions and meeting an equal number of demands simultaneously. A Friday-night order to move the contents of 10 Macy Department Stores across the river to Jersey City in time for a Saturday morning sale would be comparable.

The men who do this job are never heroes in a communiqué. They never storm a pillbox or execute a brilliant flank movement, but without them, the men who are the heroes would go begging for that next ammunition clip, that extra 10 gallons of gasoline, and all the parts that make an Army move. If at the end of "moving day" the job has been done cleanly and efficiently, it's taken for granted. If supplies are misrouted and the unloading bungled, it's the moving men who get chewed all the way up the line of rank.

They don't even have an exciting title for compensation, these men. They're known merely as "members of the Shore Party."

Moving day for the Shore Party begins after the first waves of assault troops have landed. The first job is recon-

naissance. The Shore Party Commander, an Army officer, has gone over the maps and models of this beach area with his men before they land. They know pretty much exactly how their beach organization will be laid out before they touch the sand, so the reconnaissance is more or less a check on pre-made plans.

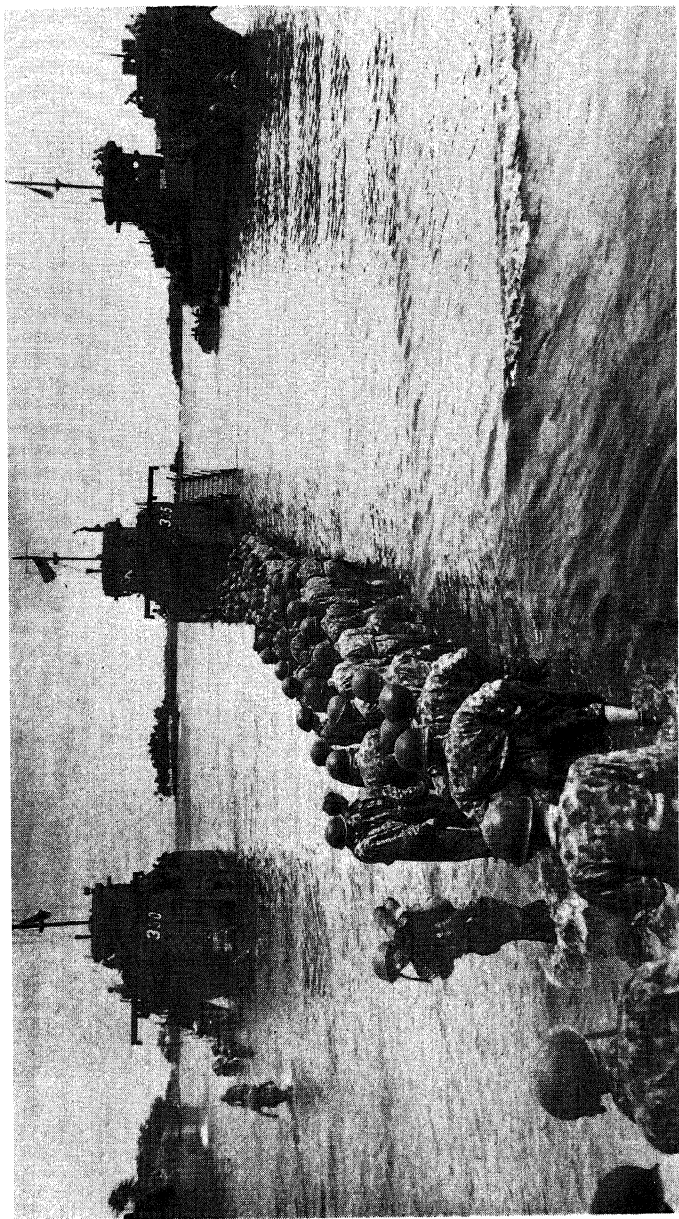
One of the first things the men on reconnaissance look for are good gun positions. The beach area must be defended. A weapons reconnaissance corporal makes certain the locations marked on the map for gun positions are suitable.

The men of the Shore Party have to play storekeeper to the cargo-loaded transports, full of supplies for the troops pushing inland. Positions, some distance behind the beach, for these supplies to be stored in are marked and divided according to commodity. There will be gasoline dumps, ammunition dumps, ration dumps, and others for general supplies.

Working with the Shore Party Commander is his Navy counterpart, the Beach Master, who is boss of the Navy's part of the Shore Party, the Beach Battalion.

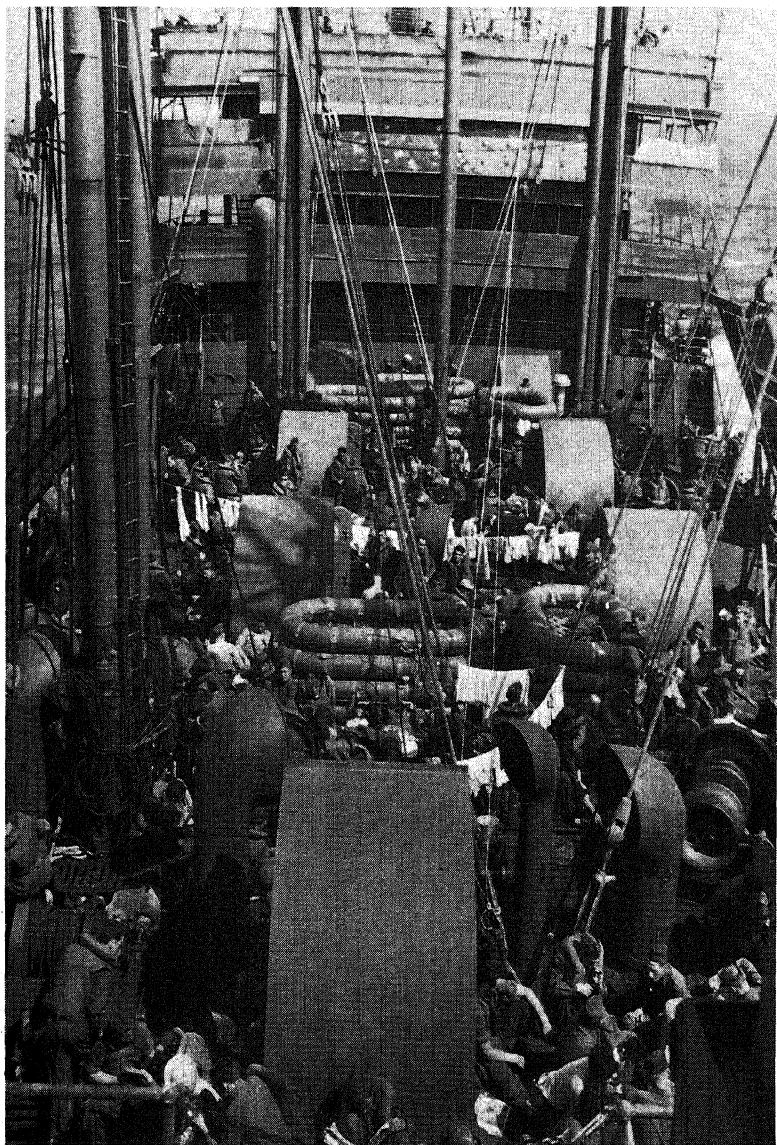
While the Army men are marking the location of supply dumps, the Beach Master is hiking up and down the beach, marking places where small boats can land. Aiding him in this is the Hydrographic Group, who survey the deep water, looking for shoals, rocks, or any underwater obstacle that might stop a landing craft before it reached the beach with its load. If any such obstacle is found, it's charted, marked for the Demolition Group, which follows, and blasted clear.

Standing by will be more Navy men, a boat-repair section. It's the Beach Master's responsibility to keep the boat traffic under control. If a damaged boat is left on the beach,



Official U. S. Navy Photograph

**BEACH PARTY AT RENDOVA
PASSING THE AMMUNITION ASHORE FROM AN LCIL**



Official U. S. Navy Photograph

A TRANSPORT IS A CROWDED PLACE

it is a hazard for other boats coming in. It has to be repaired, if at all possible, and returned to a transport. If a boat broaches, that is, washes up parallel to the beach so that it can't retract, a repair and salvage boat will attempt to drag it off with a line.

As the beach is marked, the Beach Master is notified of locations and the progress of the marking. The colored flags go up.

The Shore Party Commander keeps a check on progress from his command post. His men have selected the dump areas and will next mark places where an exit road, if one doesn't already exist, may be built from the beach to the dump area. The communications team of the Shore Party is setting up a message center where it can contact both flanks of the beach, the ships, the inland troops, and the planes overhead.

The defense weapons have been set up. The range and gun mounts have been checked. Scouts have been sent out to locate possible enemy patrols.

Other Shore Party units have now arrived, the service platoons. These boys are the piano carriers in this amphibious moving van. They are the ones who will unload the small craft as they come in to the beach. They jump across the ramp of the landing craft and run across the beach to start their first job in a hurry—digging fox holes. Each man digs his separate hole. He won't have time to complete it now, but he can get it started and finish during a lull in the boat unloading. These holes may be home for a day or so. The beach is a vulnerable place and the only protection for a man on this sandy stretch is his fox hole.

Bulldozers come off next, those great dirt-pushing, blade-

front tractors. The drivers are shown where feeder roads are needed to lead from the beach area to the dumps. The bulldozers begin pushing sand and dirt into a smooth roadway. Wheeled vehicles are going to run over that road, and sand is worse than snow to drive in. But the Shore Party has a solution for this difficulty. With the bulldozers come thick rolls of heavy wire mesh. The men grab the mesh and unroll it behind the bulldozer, smooth along the new road. Stakes are driven along the sides of the mesh to keep it from curling.

While this has been going on, a beach medical unit, composed of both Army and Navy men, has set up a temporary evacuation station. Medical supplies, drugs, tools, and blankets were brought ashore in waterproof packs designed especially for an amphibious landing. A Navy medical officer with his pharmacist's mates assists the Army doctors until a medical station can be organized.

By now the communications team has run its phone wires to a central switchboard connecting the lateral lines of the beach and a radio post. Signal lamps have been set up for making visual contact with the ships. When all lines are up, it is reported to the Shore Party Commander. He, in turn, checks with the Beach Master, who reports that the beach is ready to receive boats and cargo.

A semaphore flag chops out the "come in" signal and the landing craft start for the beach.

The Beach Master, through his signalmen, controls the incoming traffic. This shuttle system must be as orderly as possible. When the ramp of a supply-filled craft drops, the men of the service platoon start to unload it. They pass the

supplies in a hand-to-hand bucket-brigade fashion to where tractor-drawn sleds or trucks will carry it away to the dumps. A checker stands by, keeping a running inventory of all material unloaded. This is forwarded to the Shore Party Commander, where it becomes part of his "situation report."

Trucks, jeeps, tanks, and half-tracks roll out of the LCT's and LST's. Members of the Shore Party military police act as traffic cops, directing the vehicles over the exit roads to the assembly area.

Near by is a unit equipped to repair any vehicle damaged in landing, to repair it and get it off the beach in a hurry.

Stretcher-bearers bring in the wounded to the evacuation station. Those cases able to be moved are taken down to the beach and loaded aboard landing craft equipped with racks to hold the stretcher bars. These men will be taken back to the transport, hoisted aboard, and given medical care.

Supplies are coming in now as fast as the service platoons on the transports can load the landing craft and the men on the beach can unload them. Up and down the length of the landing area, this traffic comes from ship to shore. At first glance, this is one of the war's more disorganized moments. But behind this confusion of supply is organization—the Shore Party.

Men of the Shore Party need very special training. To begin with, they're a combination of sailor, quartermaster, and stevedore, plus being experts in their own particular job.

Every amphibious landing teaches a lesson in the organization of the Shore Party; every transport unloaded points

up new methods and past errors. We learned a lot from the North African landings that was applied at Sicily; and we learned a lot from scratch that was applied in North Africa. The Shore Party really started from scratch, or rather it started from a bean patch.

In the Navy's early landings, troops had been put ashore, Marines had landed, but it hadn't been necessary for the men to play turtle and take with them everything they would need in the way of supplies. They depended on more or less regular naval supply for future needs. However, in current operations, it's not a landing the Army is making; they're going in for a *campaign*, and they need all the supplies and equipment, delivered right behind the men, to fight that campaign.

How to do this was the question. The answer was the Shore Party.

In late summer of 1942, just after the land for the training station at Little Creek, Virginia, was purchased, the first training for the Navy members of the Shore Party started. The Army had something of a foundation from which to work on its Shore Party complement—the engineers, and the Engineer Combat Group is still the core of the Army members of the Shore Party. The Navy, on the other hand, had little more than the idea of what had to be done to go on.

Lieutenant Clarence R. Conger and two Coast Guard instructors at Little Creek were given the job of teaching 500 men the organization and duties of members of the Shore Party.

"Put 'em up in tents on the field," was the answer to the

housing question when the men reported. The field was an old bean patch, and neither Conger nor the Coast Guard men knew how to sling a tent. They quietly found an Army sergeant, took a few quick lessons, and went out to the bean patch to supervise the erection of tents.

Working with what boats were on hand, loaded with any miscellaneous cargo available, the men tried out on the beach what had first been written on paper as the proper procedure. Gradually a Shore Party system evolved. Then, lessons learned in North Africa were applied to a Shore Party school at the Amphibious Training Base, Fort Pierce, Florida, where students are given a 6-week course in training for the Shore Party.

In the Shore Party, as in the NGLO's, it is almost impossible to distinguish Army from Navy, and officers from enlisted men. You'll find an officer up to his waist in water, working alongside drenched enlisted men.

How well this seemingly disorganized phase of the operation was going in Sicily for example is described in an intercepted carrier-pigeon message sent from the Italian Army's 206th Division to the Italian 12th Army Corps on the second day of our landing.

It said, "Hundreds of anchored ships unloading material undisturbed. Our aviation absent. . . . Please send requested pigeons."

This unloading continued night and day. The few people still left in the little village of Scoglitti watched with wonder in their eyes as they saw the transports disgorge, and caravans of loaded trucks move up from the beach and over the wire-meshed roads. Staff cars, jeeps, and tanks rolled through the dusty limestone streets in a steady stream.

General Patton had said it would take 8 days to unload the transports of our task force. Admiral Kirk had said 7 days or less. A quart of whisky was the bet.

The ships left on the third day, with all transports unloaded.

The Attack Transports

WE WAITED on the dock for the mine sweeper that would take us out to the transport on which we would sail with the task force. As we stood there we watched the activity on the war-waiting ships and the straining, sweating, dock hands. You could smell the new wood of rows of boxes, stenciled and stamped. A red truck with a flaring banner, "Danger—High Explosives," weaved a path down the cluttered pier.

The gray ships were smoking. Signal flags were hanging in the sun to dry, like crayon-colored rainbows. Officers were standing in groups, with hands on side arms, guarding the secret mail and rolls of charts. Those charts were going out to transports already loaded and waiting.

The mine sweeper came in and tied up. We climbed over the rail and dropped to the narrow deck. The sacks of mail and charts followed. Ever so gently the screws began to stir up the oil-scummed pier water. Like an agile snake, the little mine sweeper seemed to bend herself around the bow of a destroyer that blocked our way.

Beyond the destroyer, the mine sweeper headed into clear water and we began our search for the transport berthing area somewhere out there out of sight of land. The crew,

in dungarees, shirtless, and brown and hairy as coconut shells, went about its business. Four Army officers sat near their khaki-green luggage. They were going out to board transports. There was a major, a captain, and two lieutenant colonels. One of the lieutenant colonels looked about thirty years old. He had rope-colored hair and eyeballs the color of buttermilk, deep set in a bony face. He had a dry, sagebrush, dust-bowl expression.

There were four Navy officers attached to the mine sweeper. The captain, a lieutenant, junior grade, hot as it was, had that cool, lawn-party look. There wasn't a sign of a sweat spot on his pressed khaki shirt. Creased trousers fell sharply to white canvas sneakers. From his appearance he might just as well have been on his yacht that he'd sailed to Bermuda every summer before the war.

The executive officer was the same. He had a Gary Cooper face, expensive brown shoes, crisp shirt and trousers. He looked as cool and tight-lipped as he did when he sat in his Wall Street brokerage office. But the engineering officer, an ensign, was sweating in skivies and no shirt, and he had a broad smile that exposed his Teddy-bear disposition. The communications officer upheld the theory that all communicators are a group apart. He was tall, and tapered from the waist up, inversely, like an overripe pear. His hands hung limp, even when sitting, and his only communication seemed to be by ship's radio. He never spoke.

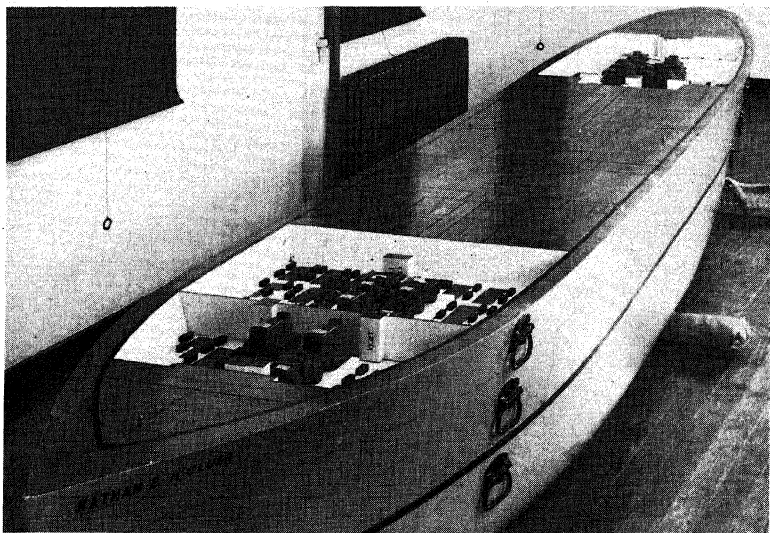
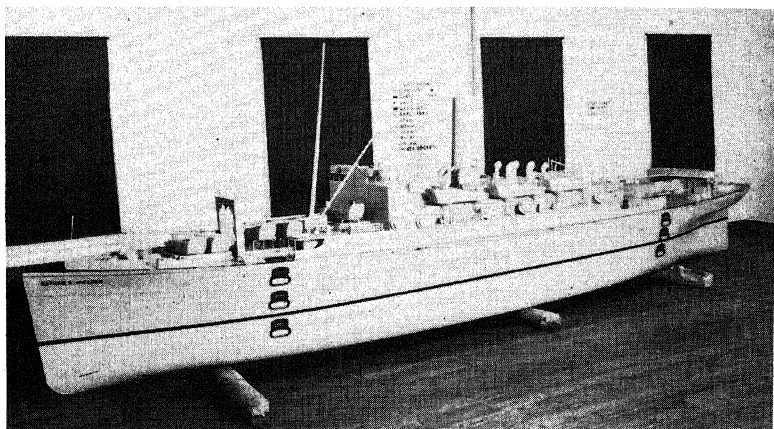
The little ship was new. It had been completed less than a month before, and the shakedown cruise was only a week old.

"We had fun along the Maine coast, and down near Boston. The Exec met a *lady*," said the engineering officer,



U. S. Navy Photograph

MODEL LST COMBAT LOADED



Official U. S. Navy Photograph

**MODEL AKA BUILT IN FOUR LAYERS TO TEACH
COMBAT LOADING**

**MODEL WITH TOP DECK LAYER REMOVED SHOWING
CARGO STOW**

accenting the last word, "who had a cottage near the shore. Gee, that was wonderful!" At this memory, his face, like a boardful of baker's dough, kneaded itself into a wide smile. "I still remember those lobsters and cold beer."

An officer messenger who was delivering the charts and secret mail to the transports said, "Oh, God, shut up! I'm hungry enough as it is."

The ensign engineer placated him.

"Well, we don't know exactly where the transports are or how long it'll take to find them, so I'll break out some chow in a few minutes. We haven't much, only some cold cuts and potato salad."

We urged him not to waste time.

In a few minutes the table in the little wardroom was spread. On the seat behind the table the bony-faced lieutenant colonel was sprawled in undignified sleep, his neck uncomfortably twisted. The other lieutenant colonel was elected to wake his sleeping partner. This he did after several soft-spoken repeatings of, "Colonel, wanta eat?"

After about four of these, the little man sat up, shaking his head and said, "Uh, huh." He slipped a fork into the potato salad before he knew what it was.

Thirty cents was our mess bill on the little mine sweeper.

In the distance we could see the line of transports against dark clouds. They looked like Norman Bel-Geddes models on a gray-velvet swath.

Our skipper proved his skill when he drew alongside the first transport. It's a hard job to maneuver a mine sweeper secure to a big ship and hold her steady enough for a man to board without scratching paint and cracking railings, but he did it.

The transports had been loaded and waiting here for several days. For the men, who had been moored here, the mere event of a small ship coming alongside was exciting. Uneven lines of faces with the ugly shapes of shaved heads watched as if this were a show put on solely for their benefit. Some of the men lost interest and returned to their pocket-book detective stories and Street & Smith magazines. Others, in shorts, their legs hanging over the sides of the stubby landing craft on which they sat, played cards and watched between deals.

These transports, as do the landing craft, represent a new part of our Navy. They're the "attack transports" of an amphibious task force. And, like the PT for patrol torpedo-boats, PC for patrol craft, and BB for battleships, these transports have an initial identity. They're known as APA's and AKA's. The APA stands for Auxiliary Personnel Attack. They are the Navy's troop transports. The AKA is the cargo transport, Auxiliary Cargo Attack ship.

These strange, boom-studded, boat-racked transports, whose pictures you see coming back from an amphibious landing, had the same trial-and-error evolution as other parts of the Amphibious Force. Like the efforts of a man with a poor mare, determined to get a Derby-winner offspring by long breeding to prize stallions, our present attack transports are the offspring of old merchant marine cargo and passenger types.

In the early amphibious experiments with the Marines, in the ship-to-shore movement, the Navy used two old Grace Line transports. Some changes had to be made in these ships, but even with the changes they were a far cry from our current combat-loaded transports. The first change

made was to put in a big sick bay to care for injured trainees, and to put guns on deck, four 3-inch, a 5-inch, and some 30-caliber machine guns.

These were the first transports to have special boats instead of the old motor launches. They carried the bureau-type tank lighter and the 36-foot Higgins-type landing craft.

These transports had no special davits, the mechanism that lowers the landing craft from the deck to the water. The regular merchantman lifeboat davit was used.

The ships were taken south to Guantánamo to train Marines under General Holland Smith. The transports were as temperamental as mules and just about as reliable. Captain J. W. Ware, USN, was Commander Transports; Lieutenant Commander J. W. Jamison was Operations Officer; Commander, then Lieutenant, Arthur E. Owen, was Matériel Officer, and a Marine major was the TQM, Transport Quartermaster.

It was a tossup as to which man had the most miserable job. Commander transports had the responsibility of seeing that his transports were operated according to the landing plan. The operations officer had to see that the plan was carried out. The matériel officer's job consisted of grooming, petting, pleading, and teasing the machinery into working, and the Marine major, as TQM, had a new horizon all his own, combat loading transports, a new idea which had to be perfected for an amphibious landing.

Captain Ware immediately saw the need of special davits to sling the landing craft over the transport's side. The old lifeboat davits were impossible. Watching the matériel officer would have given an animated cartoonist new ideas.

Booms for unloading the holds broke, the refrigerating system snapped. In rough weather the shipload of metal landing craft caused the transport's electrical system to blink out. There was no special boat-handling equipment. One transport had Manila rope instead of steel cable to lower its landing craft. All time between landings was spent in untangling this twisted, kink-infested rope.

No provisions had been made for special stowage or safety precautions which are necessary for the transport quartermaster to combat load his transport. Small boats broke down and there was no carpenter or repair shop aboard. Booms to lower the tank lighters were not strong enough and bent, and the winches were not adequate.

These were some of the defects that had to be rectified before a ship could serve as an attack transport.

It takes time to build a new transport from keel up, and we didn't have that time. Transports were needed for training both troops and landing-craft crews in the art of getting off the ship and in to shore. Ships were also needed to train transport quartermasters in combat loading.

If we couldn't get a ship made to order, the next best thing was to take what we had available and adapt it to our needs.

After Pearl Harbor, the Navy began buying merchant marine passenger and cargo ships. They were taken to yards and converted. Some of these ships were fairly new; others had already seen 25 years of service. Heavy booms were planted on deck. Holds were rearranged and enlarged to carry an amphibious landing assault load. New davits were designed which could lower a row of landing craft in record

time. For the APA type, the troop transport, space for feeding and sleeping troops had to be planned.

In the spring of 1942, delivery began on these converted transports. They came down the Chesapeake Bay for trial. In appearance, they fitted well into the new amphibious picture. They were strange ships, too. Their 40-ton booms stuck up through the deck like redwood stumps, and on their sides were three and four tiers of davits holding terraces of landing craft. The new davits were designed for "rail loading." The boat could be lowered to the level of the transport rail and troops loaded aboard there instead of going down a net into a boat in the water. On the decks were guns and other new equipment. They were still transports, but they were fighting transports now.

It was from the deck of one of these converted transports that we waved good-by to the little mine sweeper. Our transport was ready for action. She was combat loaded, manned, and armed, waiting only for the task force to form.

The biggest single job in getting this transport ready for her tee-off position had been that of the transport quartermaster, the TQM. It is the Army's responsibility to gather and load all the material that it will need to fight with and live on when it lands. More specifically, this task falls into the lap of the TQM.

The loading plan is the TQM's first concern. This plan is the keystone of his job and of the success of the operation. There is a priority rating for unloading given every article brought aboard. Everything must be so loaded that what is needed first will be loaded last. The last thing loaded is the first thing off the transport. This loading must be so arranged that when the troops leave, every man has

exactly what he will need in his hands. This same meshing of supply to man applies to the military units. When a battalion leaves the transport, all its equipment must leave in order of priority.

The loading plan depends on the landing plan. Suppose, according to the plan of assault, a certain tank is scheduled to be unloaded and carried ashore by Number 17 boat. That boat is scheduled to strike a certain beach when the troops land. If, during the unloading, the tank is loaded onto, say, Number 18 boat it will land out of position, possibly having to travel the length of the beach in the face of cross fire to get to its correct position.

Everything, down to details like this, must be planned in advance and carried out on the scene of landing as planned.

The first step in preparing the landing plan for a combat-loaded transport is a survey of the ship. Despite the fact that from a casual glance all transports look alike, each one is different from the others. Before the TQM can start to plan his loading he must visit the ship personally, go over it from top to bottom, examine every hold, every possible stowage space. However, this is not a simple matter of cargo loading where every inch of space is used. This is a pay load whose bonus is paid off in terms of quick unloading.

There's also the matter of safety precautions. After the load is planned, the chart must meet with the approval of the ship's captain, whose job it is to carry this combat material. Gasoline and ammunition, for instance, must be stored separately and in such a manner that if the ship is torpedoed and catches fire, the chances of flame spreading from fuel to gunpowder are negligible.

The TQM knows exactly what his load is going to be, down to the number of K-ration cartons. From his survey of the ship, he charts the load, indicating where and in what position tanks, guns, trucks, gasoline, ammunition, and food will be stored.

All this has meant contact with Navy people, dock hands, and port authorities. It has meant checking volumes of railroad timetables, warehouse people, supply depots, and it also means, on a troopship, very close teamwork with the commanding officer of troops, who has his say on the loading plan to see that it conforms with the tactical plan.

The TQM must know the characteristics of all transport types, plus those of the LST and the LCIL. Since he is working with the Navy and on Navy ships he must know a little Navy jargon. When someone mentions a "honey barge" he knows it's a garbage scow. When he asks about refrigerator space, he says "reefer" space. He must know dead-weight tonnage, the number of tons (2,240 pounds) of cargo that a ship can carry. He knows this is the difference between the number of tons of water displaced when the ship is unloaded, and the displacement of the ship when full, riding submerged to the load or Plimsoll line.

The TQM can figure his cargo tonnage either by weight or measurement. The weight ton is 2,240 pounds and the measurement ton is roughly set at 40 cubic feet. When someone mentions the ship's "gross registered tonnage," he knows this applies to the closed-in spaces of the ship, divided by 100. A registered ton is 100 cubic feet. If it's "net registered tonnage" he's interested in, that means the ship's gross tonnage minus all space used for crews, engine

rooms, and fuel storage. In other words, it's the space available to him for stowing cargo and berthing troops.

To teach the art of combat loading, a Transport Quartermaster School was started at the Amphibious Training Base, Camp Bradford, Virginia. Here, Army men, unfamiliar with both the job and Navy ships, are taught this complicated part of an amphibious operation.

In one end of the classroom are models of an APA, an AKA, and an LST. They are beautiful and expensive. The transport models represent about \$15,000 apiece and the model LST was insured for \$6,000.

The transport models are built in layers, each layer representing a deck. The smooth, hardwood surface is blocked out in diagram showing exactly each part of the deck, the cabins, the wardrooms, the passageways, galleys, and offices. The holds and stowage spaces are hollow.

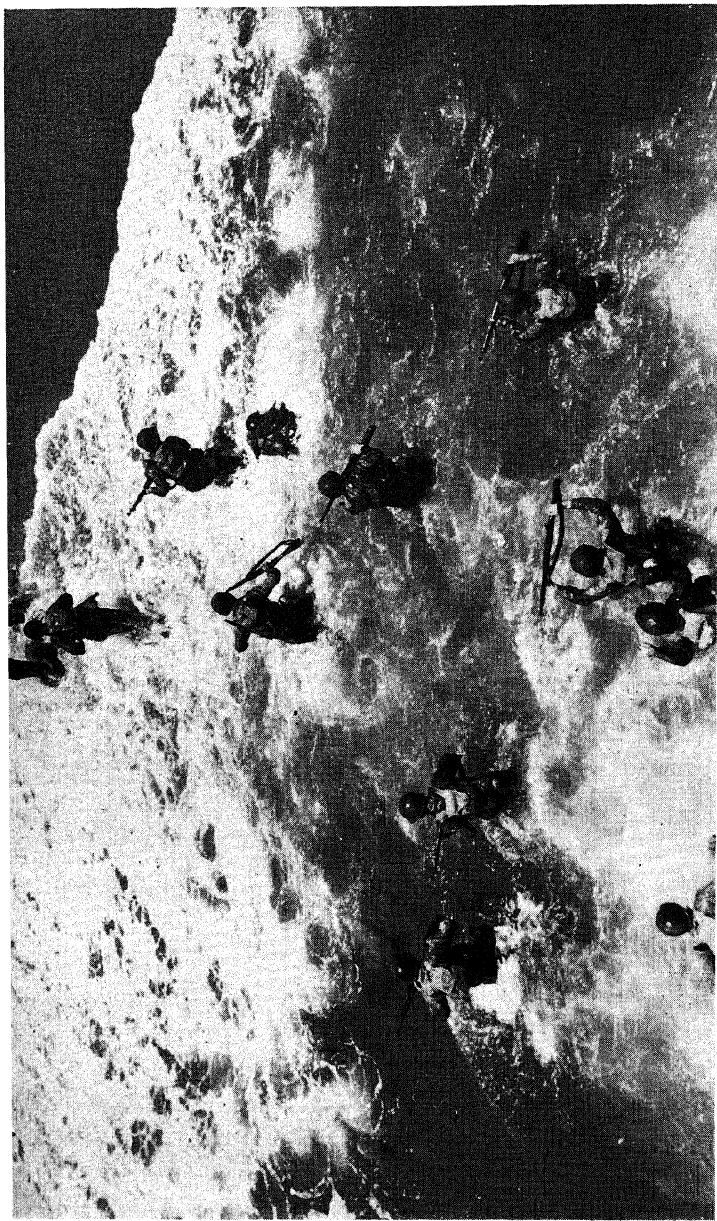
The student TQM's make a survey of this model, then combat load it with toy tanks, guns, trucks, and colored blocks, each color representing a different article such as ammunition, gasoline, or food. Each article is given a priority rating according to the tactical plan of the classroom assault. In this way, they grasp the problems involved in combat loading a full-sized transport.

The transports we saw around us, as our convoy left America for Sicily, had been loaded by TQM's who had studied these models. Their job is strenuous and nerve-racking, combining all the qualities of a diplomat and a section-gang boss. One man was left behind. He had done a good job. His transport was loaded and loaded on time. But he suffered a nervous breakdown after the last hatch had been battened down on his ship.



Official U. S. Navy Photograph

OVER THE SIDE



Official U. S. Navy Photograph

THROUGH THE SURF

The transports have an organization much like that of other naval ships. The captain, who is called "Captain" regardless of his rank, is in full charge of the ship and is responsible for the welfare and safety of all aboard.

Next in line to the captain is his executive officer. He manages all personnel, routine, and disciplinary matters. His orders have the force of coming directly from the captain. The TQM usually deals directly with the executive officer, except in minor details, which are taken up with the first lieutenant. This naval officer is responsible for keeping the ship clean, attending to repairs needed on landing craft as well as the general structural parts of the ship. He is also in charge of stowing the Navy's cargo.

There is the navigation officer who charts the course of the ship, and the gunnery officer who keeps an eye on all ordnance equipment aboard and acts as head master for the gun crews. The engineering officer sees that the transport's machinery is kept in running condition. He is the contact for the TQM on such things as lights, ventilators, and water hoses in the troop compartments.

Deck officers, usually junior officers, are divided into watch and division officers. If the TQM finds it necessary to use a boom or winch, he goes to a division officer who puts his crew to work. The supply officer runs the general mess and the ship's store. He is notified by the TQM when the troops are expected to come aboard. If special equipment is needed to handle any Army gear coming aboard, it is the supply officer to whom the TQM goes.

In addition, there is a chaplain who conducts regular Sunday services, and a special service on the night before the assault. The dental and medical officers are equipped

for regular and emergency work both in transit and when the wounded come in from the beaches.

There is not much deck space on one of these transports. It's taken up by the tiers of davits and the rows of landing craft. Additional landing craft may be resting on cradles, with only room enough for a man to walk between them and the ship's bulkhead. Debarkation stations are marked. Telephone circuits web the ship. There are loudspeakers to announce meetings and give orders, and a portable speaker is supplied to call the boats in to the side for loading after they have been lowered.

Special mess halls and galley equipment take up more of the transport space, and water tanks that carry up to 40,000 gallons of fresh water are out of sight, somewhere below.

Transport life is usually dull except for the loading period and the few hours around H-hour when nothing is dull. These ships are the draft horses of the task force, the plodders.

Sometimes there's action. The flagship signals, and you feel your chair slide as the big ship lurches in a fast turn. Then come the dull thuds of depth charges and you wonder if the destroyers got the sub or if the next moment that noise will be right under you a thousand times louder. If you haven't been torpedoed, you wonder what the first warning blast of noise will sound like.

Or the klaxon may sound the air-raid alarm, and guns fire, and for a while you forget the endless days of transport life.

Again, you might have a race as the men of the *Listing Lena* did. That isn't her name, but everyone called her that,

and sometimes names much worse. She was an old passenger ship that had developed what the boys called a "menopause shake." She would be going along beautifully and then without warning start to list. The cause was never determined, but it was provokingly uncomfortable to be in your bunk when it happened and have your face slapped hard against the steel frame of your bunk.

Lena was scheduled to leave with a task force on the North African assault. The night before sailing time she was lying anchored in her berthing area offshore. Captain J. W. Whitfield was her skipper. At 1 minute past midnight he was called by a watch officer who reported that one of the turbines had burned out. The rest of the night was spent in rousing duty officers at the base, reporting the damage, and requesting assistance. A little seagoing tug that was to sail with the convoy hooked a towline on the limping transport and started in to the base.

By 10 o'clock the next morning the damaged turbine was by-passed by the engineers who had switched to a low-pressure turbine. Running at 5 knots, *Lena* edged in to a pier at 10:30 that night.

On hand at this time was a new transport. She had been commissioned about 10 days earlier. Owing to priority given other ships for the North African trip, the new transport was standing by without equipment and unable to make her shakedown cruise. But she was going to get one. Her maiden trip into war would be her shakedown cruise.

She was ordered in to the docks and tied up to the *Listing Lena* about 3 hours later.

The task force had sailed and Captain Whitfield was faced with the prospect of unloading everything from the

Lena to the docks, then loading it on the new ship in reverse order, to conform to the combat-loading plan, and then try to catch the convoy.

Not only would the cargo have to be changed, but a counter-exchange of about 250 officers and men from the *Lena* to the new transport and vice versa would have to be effected. All of the *Lena's* boats and gear and all the commissioning equipment which the new ship did not possess would have to be switched.

Work began at 1 o'clock on Friday. Unloading such things as gasoline tins and ammunition was a slow, careful job. You can't throw cargo like that around helter-skelter. Most of it must be handled by hand.

It had previously taken 8 days to load the *Lena* for combat. The work of shifting cargo began at 1 o'clock Friday. By midnight Saturday it was completed.

The new transport sailed on Sunday and caught the convoy 5 days later. On November 8 she was unloading again at Safi, French Morocco.

The Amphibious Infantry

AN AMPHIBIOUS regimental combat team is one of the most highly trained groups of men in Army khaki.

These men begin their amphibious training as a unit already equipped for field service. They are already trained soldiers, ready for combat duty. Their amphibious training is a postgraduate course for a master's degree in modern war.

The troops that trained with the Atlantic Fleet Amphibious Force were all graduates of this course. Their alma mater is one of the first and largest amphibious training bases in the United States—Camp Bradford, Virginia. This base has turned out over 100,000 of these soldiers trained for amphibious warfare.

Each class was an entire Army division. The division to be trained reported first to Camp Pickett, Virginia, where the troops were given a primary, dry-land course. They scaled towers, slung with nets. They were taught how to adjust equipment, waterproof cases, and shoulder packs. Packs must be worn so that they can be easily slid off and dropped with almost a shrug of the shoulders. There were knot-tying classes. Vehicles and rolling equipment must be

tied securely to the decks of LST's and LCT's, and those lashings have to be unfastened quickly when the craft nears the beach.

When the troops reached Camp Bradford they began training in the attack phase. The division was split into its three regimental combat teams; each of these, in turn, was divided into its three combat teams; and each combat team was separated into three battalions each.

The three battalions of the combat team then began their beach training. The division's staff officers, in the meantime, were attending specialists' schools at Bradford such as the Staff and Command School, the Transport Quartermaster School, the Joint Communications School, and the Shore and Beach Party School.

A training day for the soldiers began at 5:30 A.M. After a march to the beach they were ready for the day's work at 8:30.

The men began their combat phase of amphibious training with mixed emotions. It was something new, and no one questioned its potential excitement. Many had never seen salt water before and many others had never seen any body of water larger than a creek. With some there was a fear of water to be overcome.

The first step in training these men was to overcome that nervous feeling about being on water. Each man was equipped with a carbon dioxide life belt. He was shown how to adjust it and how to squeeze the trigger that inflated the belt.

The men were then shown how to dig anti-tank fox holes on the beach. There are tricks even to digging holes in the sand. They shouldn't be too close together for one thing,

and the rule is one man to a hole. The holes should be a certain shape and size for both efficient use and the comfort of the soldier who might have to live in a fox hole for some time after landing.

Before the trainees rode in the landing craft, they were given a demonstration of how this boat approaches the beach, how the ramp lowers, and how it retracts. They were told how to sit in the craft, to keep head and shoulders low.

An amphibious operation was explained. The men were told how the landing craft circle in the transport area, come in to the side of the ship where the rope net hangs, and load with troops. They were given the picture then of how the landing craft move away from the transports to a rendezvous area, wait for the signal of H-hour, and charge in to the beach in wave formation.

After getting this picture fairly well in mind, the battalion was divided into boat teams. Each team was assigned to a landing craft for their first ride out. The craft beached, lowered its ramp for loading. The boat team, at a signal from the instructor, ran to the craft, jumped onto the ramp, and squatted down in the bottom of the boat. The Navy coxswain then gave the order "up ramp" and the boat pulled away.

The first trip was a short one. The boat went out a few hundred yards, circled, and came in to the beach. At the signal from the coxswain, the ramp was lowered and the men raced off, yelling at imaginary enemies, surprised that a boat could land them on dry sand with no dock.

After this the boat teams returned to the instructor and little things were pointed out that would make a great difference in a man's successful landing in a real assault. Most

of the soldiers, their first time across the ramp to the beach, had jumped straight across the ramp's top edge. This was bad form. It was dangerous.

"Suppose you landed in a surf," the instructor said. "That ramp wouldn't be very stationary. The movement of the water would cause the boat to swing and the ramp to chop up and down, a mighty easy way to have a leg or a back broken if you slipped and the ramp caught you."

The men were then shown the correct way to leave an assault boat, not directly over the front of the ramp, but at an angle on the ramp's sides.

Also in this first ride, some of the men were still afraid of the water despite the fact that all wore life belts. Those life belts didn't mean anything until they'd been tested, actually used in supporting a man in water over his head.

Boat teams formed again, loaded, and went out. This time the boat stopped about 400 yards short of the beach. The order was given to inflate life belts. Then the entire team, officers and men, were told to jump overboard and swim ashore. For some of the men this was the worst moment in their entire Army career. One by one they jumped. Those who had no fear of water jumped first, bobbed down, then popped up, their life belts swelling around them like huge doughnuts. The men who had such a psychological fear of water that they absolutely refused to jump were weeded out, given other jobs.

Now was the time to catch a quirk like that, not halfway to an enemy beach. For most men this 400-yard trip from boat to beach was a shot in their confidence arm. Not all men in any military unit are swimmers, but if every man knows that he can get to shore with a life belt he feels much

easier about playing Navy for a while. In the real assault not every landing craft is going to make that beach. Men have to know how to get to shore through deep water as well as stepping out on a dry beach from a boat.

After this, the training progressed to landing on the beach in boat waves. Boat teams of each battalion lined up on the beach, boarded the assault craft, which retracted and went out to what would be the rendezvous area in the ship-to-shore movement. The assault craft then started for the beach in waves. When the ramps lowered, the soldiers hit the beach, running.

They were taught the importance of spreading out, dispersing to make a smaller target for an enemy gun.

The next lesson was a simulated ship-to-shore movement in full. The men who went down the transport nets in North Africa, Sicily, Salerno, and Anzio, Italy, will remember this period of training, their first time down a net from a transport. She was the YAG, an old five-masted wooden barkentine.

The YAG, which is Navy for Yard Auxiliary Guard, was built for the Italian Navy in 1886. She was named the *Marsala*, after the wine city in Sicily. Later, our maritime service bought her for a training ship, painted her a gleaming white, and rigged full sails. She made a trip to Greenland and weathered every storm but one, a hurricane off Cape Hatteras in 1938. She lost all of her five masts in this gale. The hulk was towed up the James River and left, tied to a dock.

One day in 1942, Colonel Smyser, who was then Admiral Hewitt's Army adviser, flew over the port in which the old hulk was resting.

Amphibious training at this time had been handicapped by a lack of transports. Investigation by Colonel Smyser found that the hulk was being used, but only as a residence of the former captain and his family, who lived aboard her. The Navy bought her and towed her by tug to a yard where davits were built along the old wooden rails. She was then towed down the bay and anchored off Camp Bradford's beaches. Debarkation stations were numbered, platforms built on her wooden decks, nets slung over the side, and training officers had a "transport" for their ship-to-shore exercises.

When the boat teams formed for their first complete ship-to-shore drill they were taken out to the YAG. They climbed up the nets to the deck and formed in boat team stations as they would do on a transport prior to debarking. The instructors then called the boats in by number. As a boat team's number was called, it took position by the net. The men were shown how to go down four abreast, each man throwing his right leg over the rail first. This chorus-girl precision was necessary. Every man must go over the side the same way. If one throws his left leg over first and the man next to him goes over right leg first, they are likely to strike each other and one may lose his grip and fall.

They were shown how to grasp the vertical strands of the net, not the horizontal strands. The horizontal strands are for the feet. If a man goes down with hands on these strands the man above may step on his fingers. A man with crushed fingers is also likely to lose his grip and fall.

When the boats were loaded again they pulled out to the rendezvous area, formed into waves, and started for the beach. Men on shore, in the meantime, had been preparing

as nasty a reception as possible for the landing infantrymen.

The "objective" of the landing troops was in the sand dunes, 500 to 800 yards from the water's edge. In that space were flesh-cutting strands of barbed wire. There were mines, lots of mines, because a landing force must become acquainted with this type of defensive action. They'll run into a great deal of it. There were other traps, all the obstacles a man would be likely to find on a defended enemy beach. As the men left the boats and advanced upon the dunes, blank-cartridge fire blasted their ears and ground shook under their feet as the mines were electrically discharged.

With the feel of the small assault boats under their belts, the trainees moved up the scale of ships to the LCT and the LCIL. The same procedure was followed here, of troops loading, getting acquainted with this strange new ship the Navy was offering them. They were taken out, given an opportunity to feel the craft under way, then returned to the beach for unloading. Again they were reminded to get across that beach in a hurry.

By the time the LCIL phase was completed, the craft could be emptied of all troops in 3 minutes.

While the infantry assault troops were doing this the drivers of tanks, trucks, jeeps, and half-tracks that reinforce the infantry were being trained in loading and unloading on an LST. Each driver backed his vehicle up the steep LST ramp. Inside, he jockeyed it into the loading position either on the tank deck or up the elevator on the top deck. When all vehicles were loaded, the order was given for the unloading to commence. The tank deck, which carries the

priority cargo, the equipment that is combat loaded to get off first, can be emptied in 10 minutes.

These vehicle men had also gone to a waterproofing school where they were taught a process by which their machines could be driven through water deep enough to submerge the engines completely. This process had been developed in case the landing ship, in an operation, was unable to beach high on the shore. A waterlogged tank or truck, stuck in the bow doors, would mean dangerous delay.

The next phase of training was a full-scale invasion in the Chesapeake Bay. Each regimental combat team staged its own assault. Training had been geared so that all the units of the regimental combat team finished their classes at the same time. The planning officers mapped an amphibious landing on a beach near Drum Point, east of Solomons Island, Maryland. Intelligence officers supplied reports of the area. Photographic interpreters had submitted reports of the beaches. The transport quartermaster had studied the model APA and was ready to combat load his first transport. The Shore Parties had their plans for the war game.

The attack was scheduled for dawn. The objective was one of the little towns a few miles inland from Drum Point, with the ultimate goal being Washington. The beach where the practice was to take place was heavily mined, but just where those mines were, the assault force did not know. It had to find out. It also had to find out what kind of defensive installations had been set up by the "defending forces."

All units of the regimental combat team boarded the transports. LST's, LCIL's, and LCT's joined to form the assault-game convoy.

The troops were alerted at 2:30 A.M. The last prepara-

tions were made before going to the boat stations on deck as they had been taught to do on the YAG. By dawn the assault waves were landing. Sound of blank machine-gun and rifle fire, sand-shaking explosions, smoke, and the blast of underwater mines gave the men a taste of battle noise. The LST's came out of the mist and beached. LCIL's and LCT's crowded to the shore.

The exercise went well for a first dress rehearsal. Mistakes were made, but they were pointed out and corrected. All plans of the amphibious assault had been made by the men in training and tested.

With the "objective" taken, the men returned to the transports.

Back at Bradford beach, the instructors had started on another class. Captain Bert Ruud, who had brought the first LCT down from Manitowoc, Wisconsin, was coaching the drivers on loading and unloading the LST's; Major Clinton Goodwin was doing the same for the men being introduced to the LCT's. Lieutenant Bill Fuller was handling the assault boats; and two Navy Lieutenants, J. F. Mickey and Lex Moser, were loading and unloading men from the LCIL's.

And there was "that big major from Bradford." That was what the small-boat coxswains called Major Eugene Lewis, who buzzed up and down the beach in his jeep, watching the soldiers clear the ramp and cross the sand, showing a driver how to get his truck up an LST ramp. He was everywhere, shouting orders, untangling snarls of puzzled men, answering questions, passing out encouragement, and swearing like hell at what he thought were stupid mistakes.

"He wears out a pair of shoes every month," one of his assistants said.

He was the "iron major" to men working with him on the beach. Some of the trainees may have forgotten him, but one boat team will remember him for a long time. It was a dress-rehearsal invasion on Drum Point. A general was down from Washington for the review.

A landing craft was about 500 yards from shore when the coxswain gave his order "prepare to lower ramp." The cogs on the ramp brake slipped and, instead of merely preparing to lower the ramp, the ramp went down completely. With the ramp open, scooping up water, the boat drove herself under in a matter of seconds.

Major Lewis, who happened to be directly behind in a DUKW, an amphibious truck, saw what had happened. With a silent prayer that the general and his party ashore hadn't seen the accident, the major steered for the mass of bobbing heads. Fortunately, all men had followed orders and had entered the landing craft equipped with life belts. All were afloat. One by one the major helped them board the DUKW. A little later, and a little wetter than had they made their landing in the assault craft, the boat team hit the beach. They passed the general's review with no mention of the accident. It had happened so quickly and the recovery had been so fast no one on shore had seen it.

The men who trained at Bradford in the summer will remember the night exercises and the moonlit beach that reminded them of parties and peace, but this beach was churned to a froth by tanks, trucks, and running feet. Those who were less fortunate and began their training in

winter will remember few things colder than hitting the beach in weather 10 degrees above zero.

It was rough work, but it paid dividends. It made the amphibious soldier and his unit one of America's best military weapons.

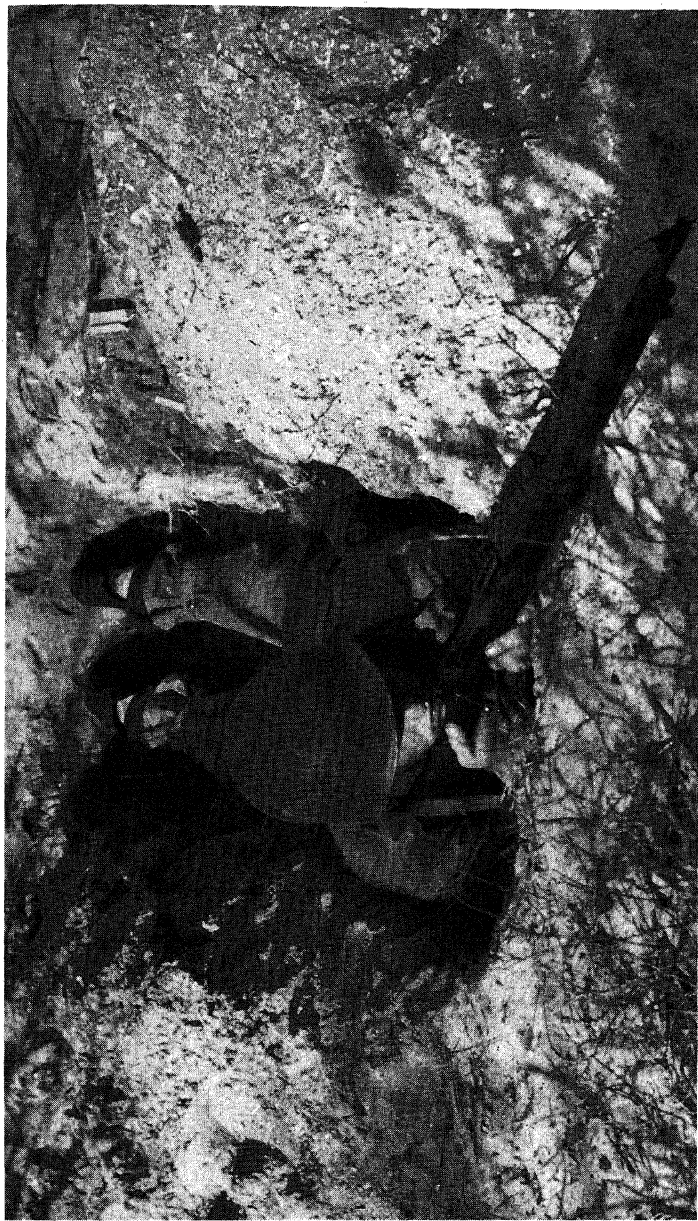
Small-Boat Men

THE torpedo crashed into the stern of the transport. The big ship swung around like a sick animal in a trap as the rest of the convoy disappeared in the night. She was a troopship in the North African invasion, bound for Algiers.

Troops were ordered to boat stations. Landing craft were lowered, the men loaded, and the coxswains began one of the longest assault-boat trips in history. Their destination, Algiers, was 180 miles away. On D plus 1, 1 day after the invasion, they entered the half-moon harbor of Algiers.

The Captain Blighs of this trip were the small-boat men of the Amphibious Force, the men who take the assault troops ashore from the transports and follow up with the shuttle trips of cargo.

The officers and men of these small boats are trained as a team, and they leave on an operation with the same team members intact. They are organized into what we call flotillas, with a full lieutenant as flotilla commander. The flotilla is made up of three groups, each being commanded by a group commander who is a lieutenant, junior grade. The three groups of the flotilla are further divided into divisions. Twelve divisions make a group, and three



Official U. S. Navy Photograph

THE FOXHOLE



Official U. S. Navy Photograph

WOUNDED ITALIAN SOLDIER AND BEACH MEDICAL BATTALION IN SICILY

boat crews make a division. The division officer is usually an ensign. Each boat crew consists of four men.

Most of the small-boat crews of the European and Mediterranean invasions were trained at the Amphibious Training Bases, Fort Pierce, Florida; and Little Creek, Virginia, the camp that grew from bean fields, oyster-shell dumps, and swampland to what resembles a training city with streets named after battle areas, such as Tulagi Street, Casablanca Street, and Midway Street.

Men are ordered for small-boat training as a housewife orders a week's supply of groceries. The training command has certain orders to fill, so many boat crews to train and deliver to transports. The supply department, in this case, is the midshipman schools, where men are under training for officer commissions, and the "boot camps" where enlisted men are being indoctrinated in Navy ways.

The officer material for a group to be trained is ordered first. These men report to Little Creek 4 weeks in advance of the enlisted men who will make up their boat crews. This is done so that the officers, who will have been trained by the time the men arrive, can then train their crews. The officer of a small-boat flotilla must be able to do everything the enlisted man does. He must know the job of every member of his boat team.

When the officer trainee arrives at Little Creek, he has a midshipman-school background in gunnery, seamanship, communications, and engineering. It's a matter of applying this general knowledge to the specific needs of small assault craft.

In these small craft communications must be good. The officer must be able to talk the amphibious language with

both semaphore flags and signal lamps. He must become an expert in his little craft's guns; he has to know what makes them fire, how they're put together, and what to do if one of them jams. He must know his power plant, that marine Diesel engine, and he attends lectures on the theory of the ship-to-shore movement, strange words for men just out of midshipman school.

The men then reach the stage of training that corresponds to an aviation cadet's making his solo flight. They are put in one of the gray, boxlike boats and told to "take 'er out." And out they go, through the inlet into the bay water. Each man is graded on how the boat is handled on this solo trip. Sometimes, if weather is rough, it really seems like a flight, with the bow running high in a take-off position, then falling in a smashing blow in the valley of a wave.

When the men pass this test, they start formation work. The 36 boats of a flotilla are taken out together, maneuvered in the ship-to-shore pattern, beached, and taken off the beach. The boats pound through maneuvers like a squadron of bouncing bombers, and it takes a lot more muscle to keep a wave-tossed landing craft in formation. There's no easy rudder control. It's your own weight thrown against the wheel, pushing against the stubborn rudder, that does it.

By this time the enlisted men have arrived. They have been going to school and studying harder than a sixth-grade prodigy going after a prize. They have lectures and lessons in engineering, seamanship, signaling, ship-to-shore movement, gunnery, and they're shown how to stand a lookout watch.

The men are tested for night vision. A good coxswain should have better than cat's eyes. His most crucial work will be done at night, trying to see a beach in darkness, steering his boat through obstacles, missing rocks.

Some of the men see much better in darkness than others. It was found that boys from the country who for years had been walking through orchards and fields, jumping ditches and dodging fences at night, had unconsciously developed a good night vision, as compared to the city-bred boy who was used to street lamps wherever he went. Without knowing it, the good night-sighters had discovered the trick of seeing things in the dark. That is, you don't look directly at the object you want to see. You look below it, or above it. For a lookout, or a coxswain, this is an important thing to know.

For testing and training men in night vision, a laboratory was built, under the direction of Lieutenant J. H. Sulzman, Medical Corps, USNR, an eye specialist from Troy, New York, who was attached to the Amphibious Force.

Lieutenant Sulzman could probably sell his lab to a carnival for a Crazy House. It's a blackout maze-obstacle course. In the maze, men are shown the value of dark-adapting their eyes, that is, allowing no light to enter the eye for at least 30 minutes prior to the time they will have to "see in the dark."

If a man enters the maze immediately after his eyes have been exposed to sunlight or even a tiny white electric light bulb, he realizes the doctor knows what he is talking about. He finds himself in a large square room with four walls and the ceiling painted black. Of course, he can find the door out of the room by feeling his way around the walls.

After that it's not so easy. The door opens onto a maze of corridors, likewise painted black. They are lighted by a tiny, shaded lamp bulb high in the ceiling, which gives approximate starlight on a dark night.

The man's first misgiving when he enters the corridor maze and stumbles forward is a cracked shin. He didn't see that two-by-four, about 8 inches high, nailed across his path. He yells and grabs the side of the railing. Another shout. He's touched some copper screen along the railing which has a light electric charge. He learns not to take great strides in the dark and not to feel his way along the maze. The only thing he can depend on to guide him is his eyes. Finally, he gets out of the maze and stumbles up uneven steps. There's a platform at the top of the stairs and more steps going down on the other side. He thought they were stairs. Instead, it's a sloping ramp. Expecting steps, and not looking, he falls down the incline and cracks his other shin on a crossbar.

Then he hears water dripping. He'll have to use his eyes on this part of the maze. By now he can see fairly well, and notices stone steps sticking up out of the water. Beyond that step is another and then a third. Confidently he strides forward. But the fourth step isn't where he thought it would be. Again, he failed to look. There's a splash and he falls face down in some 12 inches of water.

After this, he follows the doctor's instruction:

"Don't look directly at what you expect to see. Look below where you think the object will be, or above it, or to the side. Keep your eyes moving."

The man soon learns that this method is a good one. His

shins are bumped less and he doesn't fall. He can actually see things that way.

The trainee then goes through the maze again. This time he waits, seated in the large black room, for 30 minutes before tackling the trip. The corridor maze has been changed. Sliding panels have been moved and new exits made so that he can't memorize the passage system.

At the end of the 30 minutes he finds that he can see amazingly well. He goes through the entire obstacle course with only a few bumps, and those were acquired when he forgot his instructions, "Don't look at the object directly, keep your eyes moving."

This maze acts both as a training aid and a sorter. The men who have poor night vision which cannot be corrected are weeded out of the coxswain pool and given other jobs where success does not depend on night sight.

When the crew members finish their classroom work they are divided, according to aptitude, into the crew jobs: coxswain, signalman, engineer, and gunner. The coxswain is in command of the landing craft. He is the most important member of the crew. Upon his judgment, skill, and navigation depend the lives of all the troops he will carry. The signalman may not be able to flag out or flash the words of "God Bless America," but he must know amphibious signals and be able to send and receive them. The engineer must have the details of his Diesel engine as firmly memorized as the street address of his best girl. The gunner acts as "bow-hook," the man who prepares to lower the ramp and raise it at the coxswain's order. He also gets gunnery practice with a toy machine gun that shoots BB's at revolving model planes. The BB shot are brass and reflect the

light as if they were actually tracer bullets. This teaches him to lead the plane, allow for the plane's speed in flight.

When the enlisted men have been assigned their jobs, in the boat crews, the flotilla forms. The division officers are assigned three boat crews each, or 12 men. This is his command; the men are his responsibility.

The next 6 weeks are spent in training the group together, officers and men. The last exercise is a dawn landing with the entire flotilla participating. The officers and crews of the 36 boats leave the base at 2 A.M. Their first stop is the YAG, anchored midway between Little Creek and Bradford beach. The dawn landing is to be a ship-to-shore exercise. Aboard the YAG is the instructor. He calls the boats into the net by number, for a simulated loading. When the last boat of the flotilla is "loaded" and in the rendezvous area, they wait for H-hour. Then the control boat leads the way to the beach which has been mined. The support boats have spread a smoke screen for the landing. The flotilla approaches the beach in wave formation.

The coxswain shouts his first order, "Prepare to lower ramp."

The gunner unfastens a pin in the ramp cogwheel and applies the brake. When the boat beaches, all he will have to do is release the brake and the ramp falls. The boat's bow touches sand and the coxswain shouts another order.

"Lower ramp."

The iron door slaps the water and the bow of the boat is open.

The first time the coxswain beached his landing craft he felt apprehensive, afraid of hitting the shore too hard, wondering how it would feel when the bow first touched land.

Now he knows, and he drives the boat fast, smashing onto the sand. There's a slight jar, a jab, and his craft stops.

On one exercise, the smoke screen was particularly thick and a strong wind was blowing. The "bow-hook," the gunner, who was waiting for the order "prepare to lower ramp," could see nothing because of the smoke.

The order came. But by the time the sound reached the bow-hook, the wind had killed the "prepare to." All he heard was "lower ramp." Not being able to see and thinking perhaps the boat was actually near enough to lower the ramp, he followed the order. Down went the ramp and the boat.

Later, when the coxswain was asked what he did when this happened, he answered, "I said, 'Abandon ship!'"

The first time the coxswain retracted, started to back his boat off the beach, the instructor shouted a cardinal rule: "Now get your rudder midship, square with your stern, and put your knee on the wheel."

This weight against the wheel would keep it from spinning when waves struck the rudder. With the rudder midship, the surf would tend to butt the boat square on the stern and hold it in position. If the waves struck it broadside, the boat would probably broach, turn sideways along the beach, making it impossible to retract.

The coxswain was also told to keep his motor running while on the beach, driving the boat into the sand all the time. This gave him control, by using either right or left rudder, which would decrease the possibility of broaching.

Just before a coxswain leaves the beach he guns his motor. This tends to kick out a channel in the sand back of his stern, and it also throws his rudder midship for a straight retreat. Then the gears are reversed. The propellers throw

a wake of water high on the beach under the inverted-V bottom of the craft, floating it free.

The boat is kept in reverse gear until it backs free of the line of breakers. Turning and trying to travel bow first before the line of breakers is past is dangerous. A wave might catch the craft broadside, causing the coxswain to lose control. The training has been rugged. Those 2 A.M. trips out of the base and up the bay to the YAG were not pleasure cruises, especially in winter. The only pleasant aspect about them was the huge steak dinner served the crews at 11 o'clock.

Small-boat officers are carefully chosen. They must pass a physical examination as strict as that given to pilots and submarine men. In addition, they are examined by a psychologist to determine if they are temperamentally suited for this work.

At first, duty with the Amphibious Force, and especially in small boats, was considered a suicide assignment. The job was new and unknown. Men were afraid of it. That condition has changed by now, to the extent that men are volunteering for amphibious service.

A small-boat man is busy from the moment he first sees the camp piers with their landing craft carpeting the water, nestled closer together than a stockyard full of beef cattle. From the time he starts his "marlinespike seamanship" through the last chalk-talk blackboard class, he is absorbing the part that small boats play in amphibious warfare. He gets strange new clothing, blue jungle-cloth uniforms whose jackets have an inner lining of paper to break the wind and insulate body heat. He gets a face mask, helmet,

gum-bottomed shoes, and heavy mittens. He'll need all this. His job is a cold and wet proposition.

He learns that his landing craft is not just a smalltime ferry, but a definite cog in the landing plans that depend on split-second timing. He learns that there is more to piloting a boat than just steering it. He is taught to compensate his compass. He learns about tide and currents, both important factors in a shallow-draft boat. The officers are taught how to stand deck watches, because on the transport they will become part of the ship's company. They are taught gas defense and first aid, how to salvage boats on the beach, and how to read the stars by studying a constellation board.

They learn how to read the different beach markers that indicate where gasoline, water, and ammunition will be landed.

There are two types of small-boat officer: the "mustang," former enlisted men, petty officers, who have been commissioned; and the reserve officer out of midshipman school. Throughout the training period there is a friendly rivalry and competition between these men. The mustangs are prone to condescension, wondering about the fact that it took them 20 years of hard Navy work to get a commission, while a youngster just out of college, with no experience, gets the same rank.

The midshipman says, "Why not? I'm smart. I can do the job. The Navy's not my career. But I'll do a good piece of work while I'm in it and then go back to my old job."

This has led the mustangs to call the reserves "feather merchants," an old Navy term applied to a man who was looking forward to the end of his enlistment period, at which

time he was always going to leave the Navy to buy a farm and raise some chickens.

Most of the mustang kidding is just that and nothing more. They see the new men learning and doing a good job. But they have a proprietary feeling about the Navy. It's theirs. These other fellows are in for the ride, and when the bus stops they'll get off.

One mustang reproached a new man one day who had made a mistake.

"Look here, you feather merchant—" he began.

"You're damned right," said the new man, who had left a good job and his home to join the Navy, "and I've got a feather and a nest to put it in, too!"

It was a telling blow. The old mustang was one of the men who, for the last four enlistment periods before the war, was going to get that chicken ranch and live a sedentary life.

Some time after this skirmish the two men became good friends.

This is a fast bus the small-boat men have hailed for the ride, and they're proud of their seats. Likewise, most of them complain. Grouching is a good old American habit irrespective of rank.

"It's a hell of a job we've got here, ain't it, Mac?"

But don't let that coxswain fool you. He's proud of that title "Coxswain," even though at times he hates that flat-bottomed boat with a passion.

D-day for Lollipop

D-DAY for Lollipop is S plus 14."

This sentence is hardly more intelligible than the jibberish chant of a tobacco auctioneer. It means that an amphibious operation has been planned. "D-day" is the day on which the assault will take place. "S plus 14" means 14 days after date of sailing. "Lollipop" would be the code name for the operation, the enemy beaches where our troops will land.

Lollipop was planned for strategical and tactical reasons as an offensive operation. It may be on virgin enemy territory as yet untouched by us, or it may be a leapfrog landing such as the one south of Rome, near Anzio, to force an enemy withdrawal from established lines with a minimum of Allied casualties.

The men who planned Lollipop, which is any hypothetical amphibious operation, were faced with a very particular kind of planning. It was different from either a regular Army or Navy campaign. It was a combination of both. The action would have a naval beginning and an Army campaign ending.

Plans started with a group of senior Army or Marine and Navy staff planners. From the decision of these men

come the orders for an operation with four broad points outlined: where to strike, what to strike with, the names of the men to direct the operation, and the date.

Where to strike, the objective, is usually stated in broad terms. In the North African invasion, for example, the objective was "the occupation of Algeria and French Morocco," while in the Marshalls landings, the real objective was first Kwajalein atoll. In Eniwetok it was the strategic Engebi airfield.

The second point, what to strike with, the means for executing the operation are listed, so many troop divisions, and aircraft support, and so many naval ships listed by type.

The third item, the leaders who will command the operation are named, and a D-day, or a period within which D-day will fall, is designated.

Using the invasion of the Marshall Islands as an example for the last three points, the means for this invasion were both Army and Marine troops. The Army men were from Major General Charles H. Corlett's 7th Division, veterans of the Attu landings. The Marine troops were from Major General Harry Schmidt's 4th Marine Division. Admiral Richmond Kelley Turner, USN, was in command of the naval forces.

D-day for Kwajalein was January 31, 1944.

With the four parts of the plan drawn by the higher echelon of command—the objective, the means available to attain that objective, the commanding officers named who will use those means, and D-day named—the detailed planning of the landing then falls to the men who will direct it.

This is where the parts of the amphibious pattern start to weld together.

The military "estimate of the situation," or prepared outline of what is necessary and what will be done to achieve the objective, is to be submitted first. At the same time, the naval plan is being written. All phases of military and naval intelligence and every available source of information are at the disposal of the military and naval commanders in their planning.

The plans must be combined and fitted together into one play that will satisfy both sides. Suppose, for example, one part of the military plan calls for a landing on a certain beach area. This is proposed to the Navy, which objects, saying that the beaches there are not suitable, that there are rocks and shoals that will make a landing impossible. A compromise is reached. There is a beach a few miles north or south at which a landing can be made successfully and the military tactical plan is changed accordingly.

In drawing the plans for the Marshalls invasion, Tarawa was remembered. The Japs had 20 years to fortify their Marshalls defenses, and little Tarawa was taken at a very bloody price.

It was decided, therefore, not to land on the Marshalls bases, Wotje and Maloelap, nearest Pearl Harbor, or even on those nearest the Gilberts on the south, Jaluit and Mili. Again, using the first amphibious commandment, "Land where the enemy doesn't expect you," Kwajalein atoll in the heart of the island group, largest and most important, was chosen as the landing target.

Remembering that 3,000 tons of bombs and 4 hours of shelling had little effect on Tarawa's cement and coconut-log defenses, the softening of Kwajalein began 17 days before the invasion by Army and Navy bombers. Bombard-

ment of the atoll from the sea began 3 days before troops landed.

By the time troops were ready to land 15,000 tons of exploding metal had gouged the Jap island. At H-hour the Army troops struck south at Ninni. Around the ring of coral to the north the Marines landed at Roi and Namur.

Two million tons, more shipping than we had in our entire prewar Navy, and 30,000 men were employed in this invasion.

In planning any Lollipop, the unexpected must be considered. Since the Army is landing for a campaign and not just a raid, and since it must also plan to meet the maximum resistance, thought must be given to the vulnerability of troops in transit. If a ship is torpedoed and no provision made in the plans for such a contingency, when the landing occurs the invading force will be undermanned and hard put to meet its tactical demands.

"Maybe we had too many ships and men for this job," Admiral Turner was heard to say after the Marshalls landings, "but I prefer to do things that way. It was many lives saved for us."

Plans must be flexible to offset a loss of any kind, and also to meet any last-moment changes of strategy. This flexibility is one of amphibious warfare's greatest assets. Its strength is concentrated and mobile. The object of any amphibious landing is to place our forces where the enemy isn't expecting them. If you discover the enemy is expecting you to land at the place you had picked out you can shift if the plan is flexible, land elsewhere, and strike before he can move his strength overland to resist.

The types of ships, planes, and troops must be planned

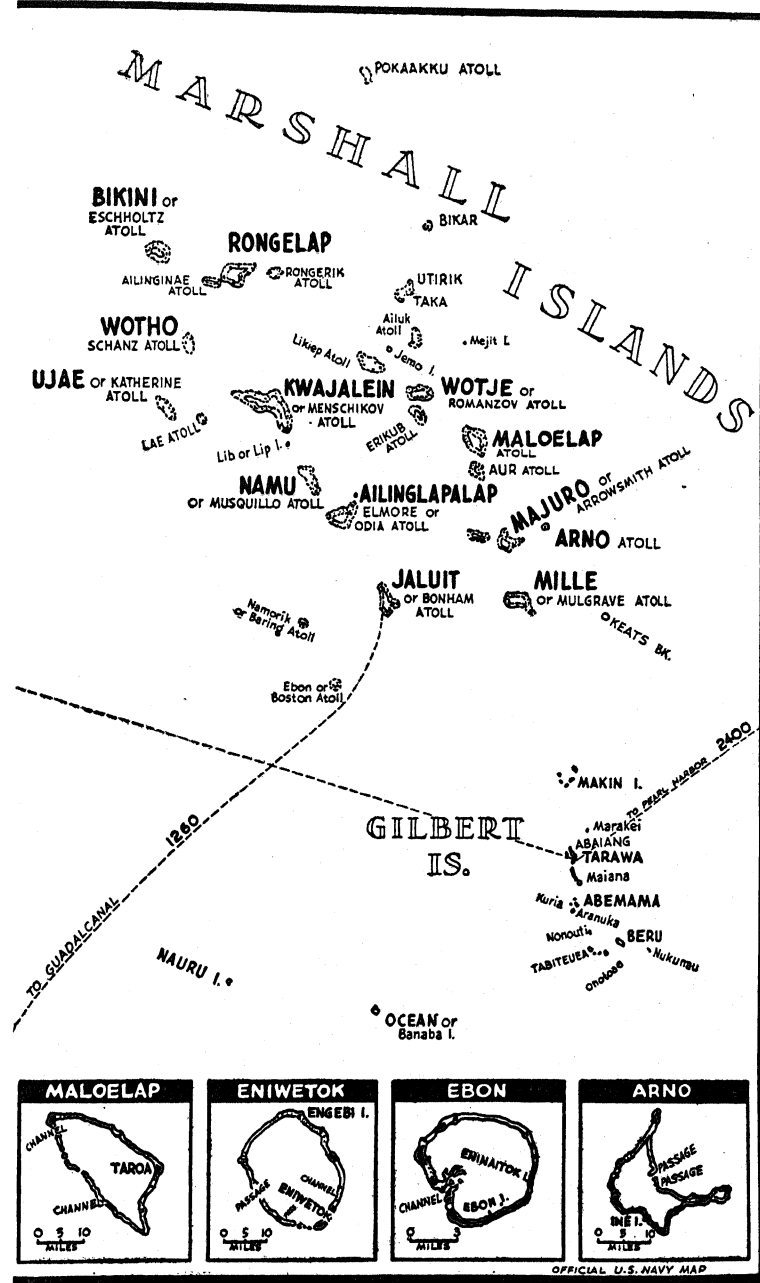
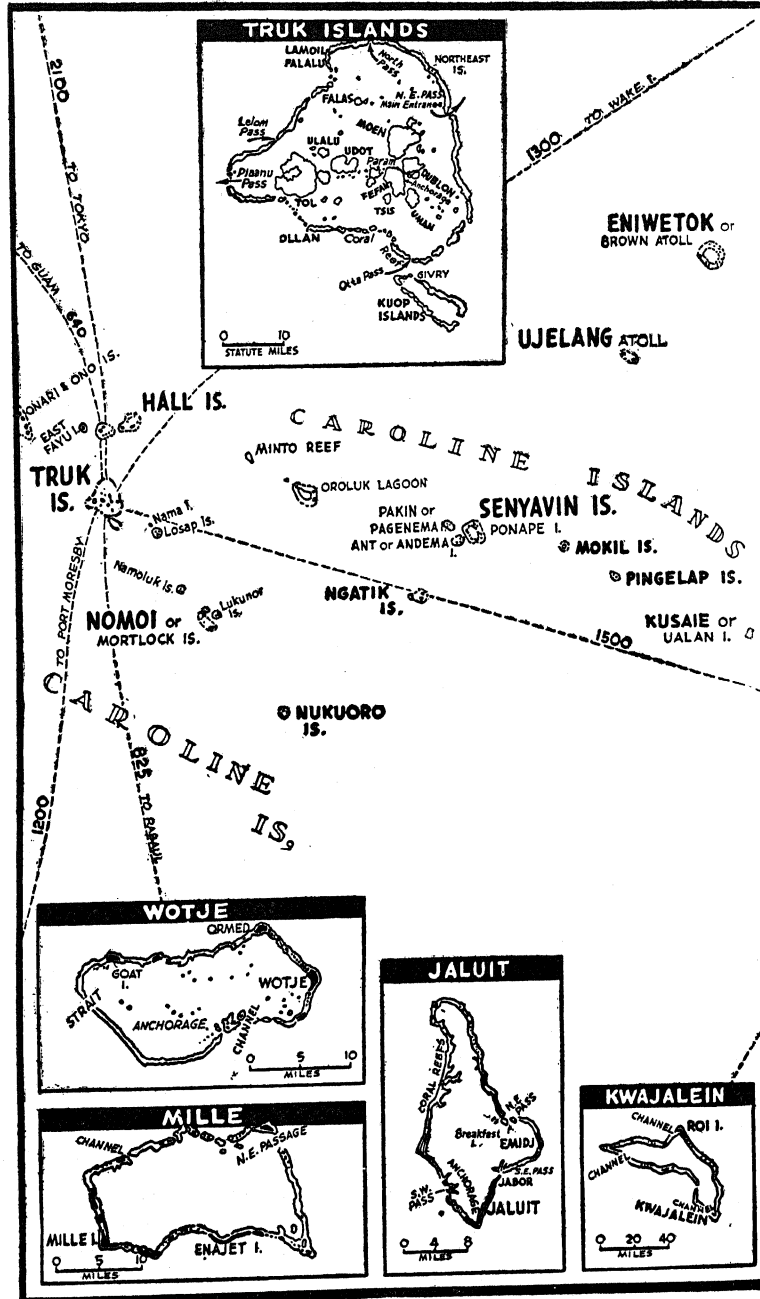
for. If the Army feels that it will need shore bombardment, the Navy must plan for the battleships, cruisers, or destroyers needed. If the objective is beyond the range of our land-based planes, aircraft carriers may be included in the plans. The number of paratroopers, armored units, engineers, antiaircraft battalions, and all the types of troops to supplement the infantry must be chosen and incorporated in the planning stage.

In carrying out the plans for an assault, a priority rating is given the operation and all orders carrying its code name. If our hypothetical Lollipop, for example, were given highest priority, any ship, gun, man, or tank whose order carried the designation Lollipop would take precedence in delivery over lower priority ratings.

It takes time to plan a Lollipop. All the section officers under the Army and Navy directors have their specific plans to write and incorporate with the major plan. The gunnery officer writes the plan for naval gunfire. There's the joint communications plan, unbelievably intricate, linking land, sea, and air units. The air plan must be worked out with the Air Force that supplies fighter and bomber coverage. The intelligence reports are prepared and briefed, terrain models made, and the transport quartermaster must have his combat-loading plans prepared.

The Navy's Transport Division Commanders must complete boat assignments and unloading plans for the troop commanders. Rendezvous, cruising, and convoy plans are made for the crossing. This may entail a splitting and dividing of task-force groups at a certain position and time.

The master timetable is drawn. Every activity has a dead line. Supplies must be ordered, delivered, and loaded



by a certain day. The task force of Army and Navy must leave on a certain day to be at their destination at H-hour. The time for H-hour is set, and the unloading schedule synchronized in relation to that hour, as well as the shore bombardment which must lift just before the first wave of troops lands. Everything must be planned with split-second timing.

The larger the operation, the more complicated is the timing and the fitting together of the parts. Even with all the amphibious elements at a planner's command to use and pick and choose from, it's a long step from a staff meeting to a day called "D" and an hour called "H."

Logistics for Lollipop

EVERY amphibious landing teaches us something new about tactics, the use of men and material, and logistics, the supplying of men and material for tactical use.

The job of supplying several Army divisions already established and fighting in the field is a gigantic task in itself, but it is simplified by several means of transportation from central supply dumps. Trucks, trains, and transport planes can make regular daily trips with food, ammunition, and supplies for men at the front. However, supplying these troops with everything they need to fight with until they have control of an area where convoy shipments can be dumped and the central supply system organized is one of the items that makes amphibious warfare the most difficult to wage as well as to plan.

The ships that carry the landing troops must also carry the supplies they will need for 15 or 20 or 30 days. This includes everything from the largest artillery gun and its ammunition to water canteens for the infantrymen.

The amount of enemy resistance the troops will meet must be estimated before any planning can be done on what supplies to take along. The units of fire must be estimated, the

amount of food and water must be carefully and accurately estimated and loaded before the transports sail for the invasion. If this estimate is low and the resistance is stiffer than expected the invading troops may be forced to withdraw and the landing become a failure because of poor planning, lack of supplies. To avoid this, microscopic planning and good intelligence information are necessary.

The first test of amphibious logistical planning, and at the same time the most crucial one the planners faced, was the invasion of North Africa. This was to be an entry into a new war theater. There were no sources of resupply in Africa. If supply plans were short of needs, the nearest sources were England, Eritrea, and Massaua. If the invasion ships had carried only a 10-day supply of material for the landing forces, for example, it would have meant unloading, returning immediately to England for additional cargo, and going back again to Africa. Obviously this could not be done. Enough material had to be taken in with the invading forces to last until ports and harbors were captured, convoys came in, and a central supply organized for overland delivery by truck and train.

By now both the Mediterranean and the Pacific are well-organized war theaters. This was not the case when we first began to worry about amphibious logistical problems, which are the nerve center and backbone of an amphibious operation. They are also probably the one thing that injects the most trouble in training. Putting a man with a rifle ashore is duck soup, but keeping that man supplied with what he needs and keeping it coming on schedule as he advances, without sacrificing naval craft is a tough assignment in a ship-to-shore invasion. Shorter distances make this problem

somewhat easier in a shore-to-shore movement, but in the ship-to-shore landing the transports must be unloaded and out of range of enemy aircraft and shore bombardment at the earliest possible moment.

The answer to this amphibious logistical problem was the transposing and adapting of the Army ground-supply organization to the beaches and water. The result was the transport quartermaster, the boat unloading plan, and the Shore Party.

When planning begins it is important that the tactics be flexible, but this does not mean flexibility because of lack of detail. Tactics and logistics go hand in hand, planned together, down to the details of each man, his equipment, where each will be employed.

If it is known from the tactical plan that the supplies are going to have to be moved quickly and in quantity from the Shore Party's beach dump inland for some distance, it will be necessary to include large trucks in the cargo. If someone had misinterpreted this plan and loaded only light trucks, the movement of supplies would be slowed, the advance would be slowed, and probably a precious first-day's chance to strike the enemy before he recovered from the surprise landing would be lost because of poor planning.

As the tactical plans for a Lollipop D-day are outlined, the supply needs are charted. The military units are assigned to their transports. The weight and cubic displacement of the units' bulk supplies are computed. Their supplies are prorationed to ships and combat loaded according to the transport quartermaster's survey and loading plan.

What this unit's supply consists of has been determined by the nature of the operations. Reconnaissance photo-

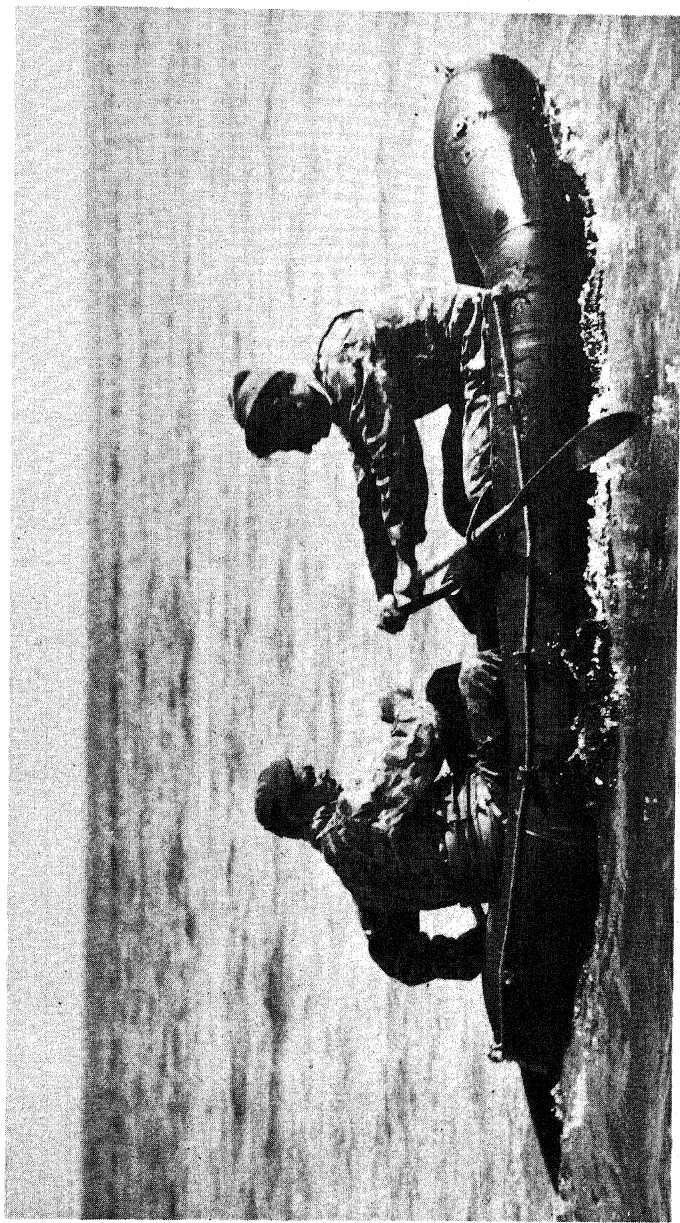
graphs will indicate the extent of engineering construction material needed. The type of terrain where the troops will land dictates the kind of weapons best suited.

The men in the units must be inspected for equipment shortages. Every man must have his normal fighting gear plus items for the amphibious landing, such as waterproof gas masks, gun covers, rope, wire mesh, beach lights and lamps.

Care must be taken to ensure that supplies ordered are as logical as possible, that food, clothing, and extra equipment balance with guns, ammunition, and fuel in order-of-fighting priority. Small things like shoes and the type of sole must be considered. Footwear should be waterproof and the shoe soles nonslippery. A stumbling, sliding soldier is more of a hindrance than an asset in the rush of men from landing craft to beach.

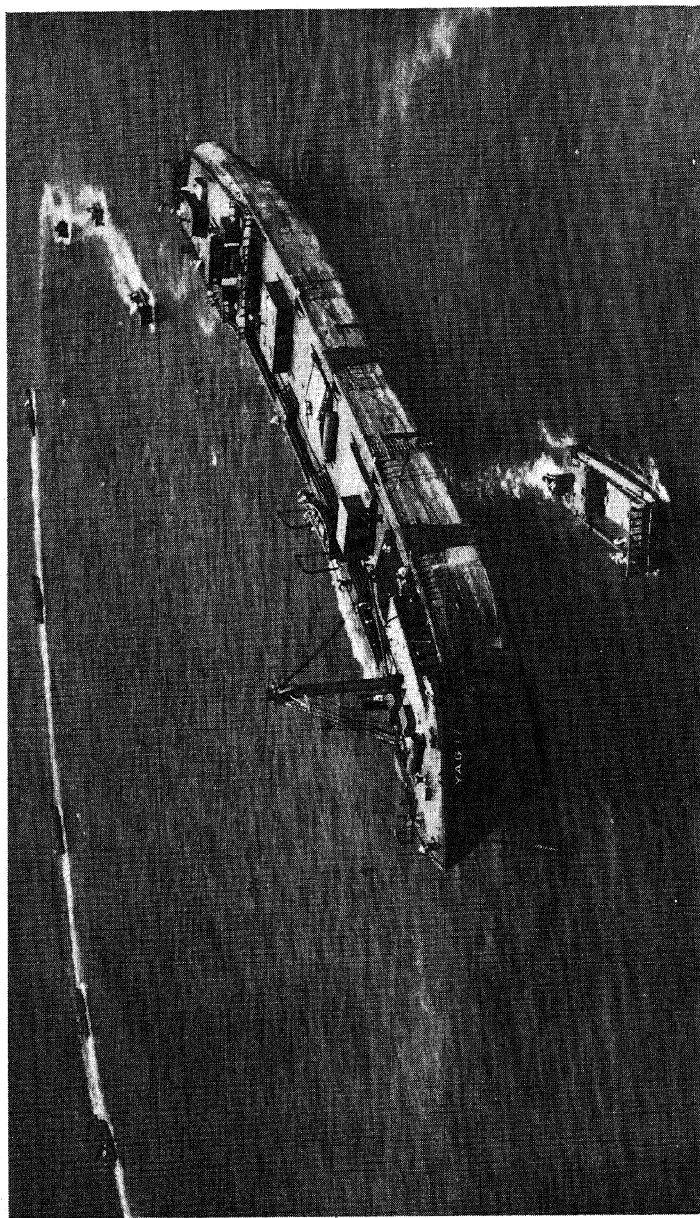
The supply schedule must be synchronized with the master timetable and loading plans. The supplies must arrive on time for the transport quartermaster to load. Food, bulk and canned emergency rations, is provided. Fresh water must be stored aboard. Each man landing will carry a full canteen of water strapped to his belt. Additional water tanks will be set up on the beach and filled by boats carrying water from the transport's tanks. Providing this water is the Navy's responsibility. The Navy distills it and delivers it to the beach, at the time of landing, where the Army stores it in canvas tanks.

Gasoline and oil for the vehicles must be supplied, and in quantity estimated to last until the normal supply system is running. Gasoline is almost as important as ammunition to a mechanized army. This estimate must be very accurate.

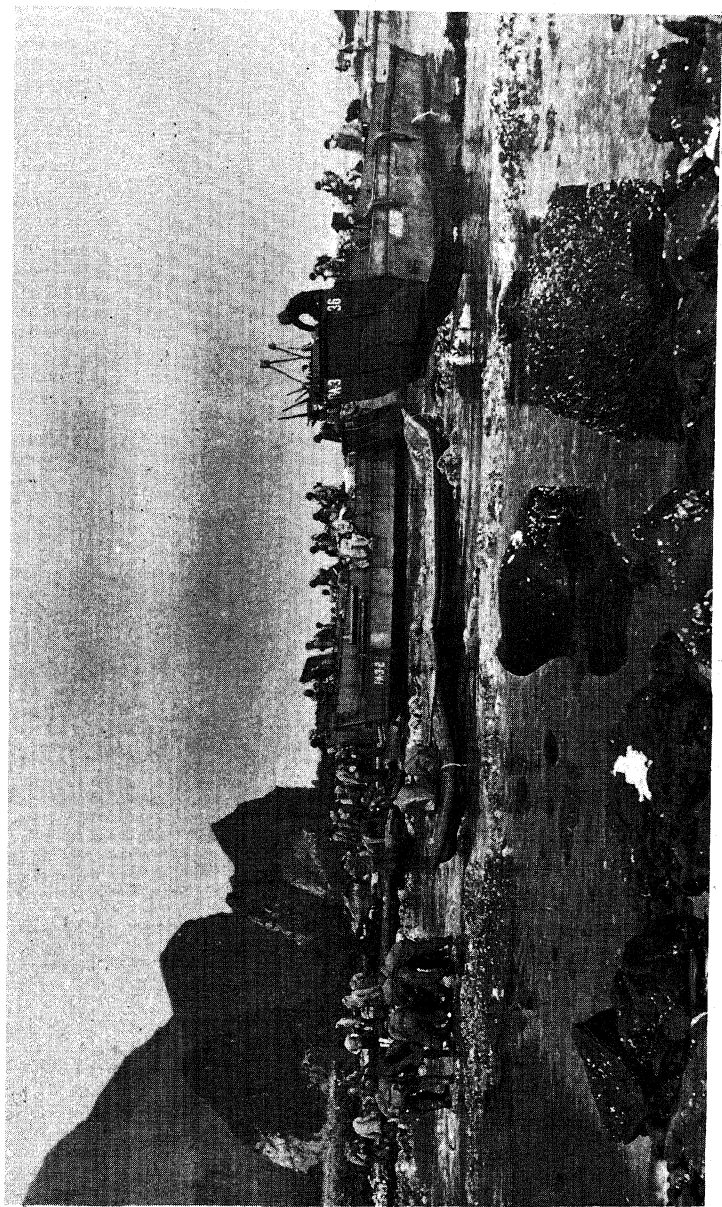


Official U. S. Navy Photograph

THE LCR
(Landing Craft Rubber)

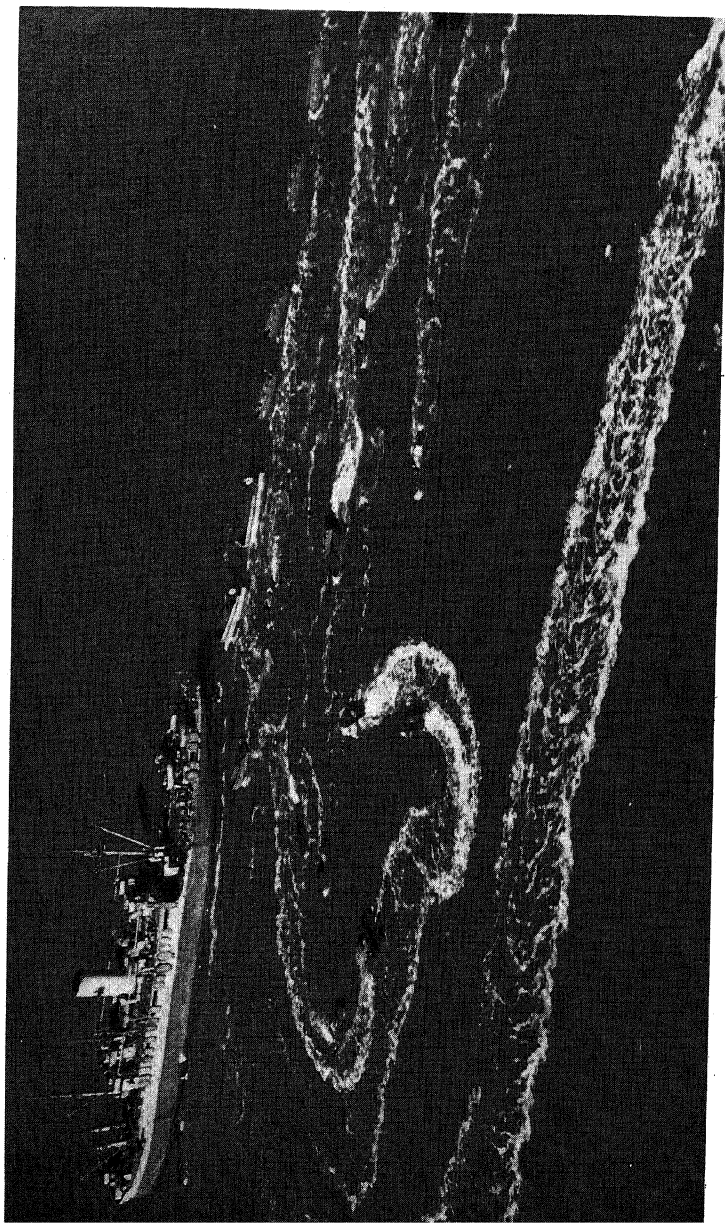


SCHOOL MISTRESS FOR INVADERS—THE YAG



Official U. S. Navy Photograph

WE LAND ON KISKA



Official U. S. Navy Photograph

RENDEZVOUS

Until dock facilities are available where tankers can come in and unload in quantity, the landing forces run on a supply carried ashore in tin cans and stored by the Shore Party in the fuel-dump area.

Dock and harbor facilities within reach of the beachhead area will influence the supply planning, as will the number of ships employed and the estimated time interval before resupply.

A ship-to-shore movement has two phases: the tactical, in which the assault troops and fighting equipment are unloaded; and the logistical, which is the unloading of supplies from transport to small boat, from small boat to sleds or pallets on the beach, and the transporting of these sleds to supply dumps. This is a man-power job which is circumscribed by human limitations. It's a backbreaking, dangerously exposed, top-speed job.

A ship's officer is in charge of unloading the transport. Standing on the bridge or near an aft gangway, he controls the loading and dispatching of boats at each unloading station. Working with him is another ship's officer at a signal station, who calls the boats to the transport's side from their assembly area, an open space of water where they circle while waiting their turn to load. The transport quartermaster acts as assistant debarkation officer. An engineer ship platoon works in the holds, filling the rope nets with supplies. These net slings are operated by the derricks that lift the load from the hold and swing it up and over the rail into the landing craft.

Both time and volume are factors in unloading these supplies. The troop commanders need them as soon as possible

and the transport commander is anxious to lift anchor and cease being a target for enemy planes.

The unloaded supplies pass through three stages: landing team, regimental, and divisional. A landing team will establish an initial reserve supply dump near the beach where it lands. As additional supplies come ashore, the Shore Party sorts the material into larger dump areas for the regiment, and then into still larger dumps for the entire division.

From these dumps, the supplies are moved by truck to regimental and divisional posts where they are fanned out to the fighting lines.

Teaching the men who handle supplies and getting them enthusiastic over the job is a hard task for an amphibious training instructor. On the beach, the men are targets of persistent strafing. Those supply dumps are choice bull's-eyes and the natural reflex of self-preservation is a thing to contend with. A man's first instinct when he hears a plane is to dump his load of supplies or a shovel or whatever he's doing, and either run for a gun to shoot or just slide to his belly.

It's sometimes hard to convince a man that his job of handling supplies is just as important as that of his pal who is pumping 155-millimeter shells into enemy lines. But if it weren't for his work and the men who planned the shipload of supplies, Pal wouldn't have those shells to fire, and Lollipop would never have a D-day.

And They Will Land Again

THERE will be many more D-days in 1944 and 1945 following the biggest one of all, D-day for the German-held continent of Europe.

As the war shifts from Europe to the Pacific, our forces will be spread in a theater of 70,000,000 square miles, ranging from the Aleutians to New Zealand and from the China Sea to the west coast of the Americas.

For these D-days to come, planners will have at their command an invasion fleet of 80,000 craft. Even if this figure were just an idea, and no keels had been laid, it would be a long, vindicating step from the March, 1942, days. Those were days of skeptical meetings and back-to-the-wall plans, when it was sometimes alarmingly difficult to get outside enthusiasm for amphibious operations.

There was the staff meeting in which proposals were met with stony silence until one officer rose and said, "Gentlemen, if we are to win this war we are going to do it on the outskirts of civilization. We are going to have the subject of amphibious operations with us until the end. It's going to become more and more important in our strategical concept of the war."

Since that time, and before the major invasion of Europe,

our forces have landed almost 30 times on the outskirts of civilization, on enemy beaches. More than a dozen amphibious forces have been formed, trained, equipped, and prepared to strike where plans call for troops to be landed.

On February 14, 1944, our troops landed on the Green Islands, ending the Solomons campaign. On the same day our planes were dropping bombs on what the Japanese called impregnable Truk.

Three days later another force landed and established beachheads on Eniwetok atoll, the most western of the Marshall Islands. Twelve days after the Eniwetok landings a communiqué announced that another force of American troops had landed on the Admiralty Islands, outflanking New Ireland and New Britain. It said: "The end of the Bismarck campaign is now clearly in sight."

Strategy for the defeat of Japan has been planned.

The D-days are going down on the calendar.

**Lieutenant EARL BURTON,
USNR**

left the Washington office of *Time* to join the Navy in August 1941. A native of Oregon and a graduate of George Washington University, he had travelled as a free-lance journalist in England, France, Germany, Italy, Greece and Africa before joining *Time's* staff. In the Navy he has served at London Naval Headquarters, at Allied Force Headquarters in Algiers, and with the Atlantic Fleet Amphibious Force in the Sicilian invasion. At this writing (April 1944) he is assigned to the Headquarters of the Atlantic Fleet Amphibious Force Training Command; but he may well be elsewhere by the time you read these lines.

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